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ABSTRACT

The purposes of this study were to: (1) establish existing computer literacy levels among faculty members at El Camino College, California; (2) determine the principal obstacles to self-directed computer training, along with strategies designed to overcome these obstacles; and (3) develop recommendations concerning the structure of self-directed, independent study computer training programs for faculty at El Camino College. Faculty members were surveyed to identify their attitudes toward independent study computer training programs, and the willingness of faculty groups to take formal versus self-directed computer training. Obstacles to computer training programs and strategies needed to overcome those obstacles were identified by the survey group. Results of the survey also indicated that significant differences in computer literacy rates exist between academic departments. The implications for improvement of educational practice arising from this project is that computer literacy rates may be increased through self-directed, independent study computer training programs. Appended materials include the Obstacle and Strategy Questionnaires (both Delphi studies); the Computer Usage Survey Questionnaire; listings of college staff development programs in computer technology for El Camino College and Ferris State University; and a brief biography of the author. (90 references) (DB)

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DEVELOPING A SELF-DIRECTED COMPUTER TRAINING PROGRAM FOR EL CAMINO COLLEGE FACULTY

by

Donald F. McAllister

A Major Applied Research Project Presented
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Nova University
November, 1990

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Abstract of a Major Applied Research Project Presented
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November, 1990

This study arose from discussions with the deans of instruction of El Camino College, California, during which it appeared that there was a need to develop self-directed faculty training programs in the use of computers. There was little necessity to convince the computer-literate faculty that microcomputers should be used in their educational activities. However, it was difficult to make faculty who were not computer-literate see the usefulness of microcomputers in their work, or to convince them to take advantage of existing staff development programs in computer training. Developing self-directed programs in computer training and basic computer literacy seemed to be one answer to this problem.

The purposes of this study were (1) to establish existing computer-literacy levels among faculty members at El Camino College; (2) to determine the principal obstacles to self-directed computer training, along with strategies designed

to overcome these obstacles; and (3) to develop recommendations concerning the structure of self-directed computer training programs for faculty at El Camino College.

Faculty members were surveyed to identify the perceived need for self-directed computer training programs, and the willingness of various faculty groups to take formal versus self-directed computer training. Faculty group differences were tested at a .05 level of significance for math/science compared with humanities faculty. In both groups the percentage of non-computer-literate faculty was greater than fifty-percent. In addition, the most preferred method of computer-training for computer-literate college faculty was self-directed training or self-taught at seventy percent.

A twenty-five member survey group of computer-literate educators at El Camino College ranked the following obstacles most important: (1) nonavailability of personal computers, (2) lack of troubleshooting assistance when needed, (3) lack of interest in computers, (4) lack of motivation/reward for learning to use computers, (5) inability to understand written directions for use of computers or software, (6) other obligations or demands on time, and (7) computer anxiety. A second survey then produced a list of top-ranked strategies needed to overcome each of the seven major obstacles to self-directed computer training at El Camino College that were identified by the survey group.

Application of the computer usage survey instrument of Appendix C to two groups of twenty-five randomly selected

humanities and math/science faculty showed that there were significant differences in computer-literacy rates between the humanities group and the math/science group. Forty-eight percent of the math/science group were computer-literate, while only twenty percent of the humanities group were computer-literate. Demographic data compiled during the survey showed that there were no obvious age differences in computer-literacy. An extensive literature search substantiated most of the results obtained in this study. For example, researchers have reported in the literature that self-instruction is the largest source of computer training among those faculty members who are computer-literate, and that self-directed computer training is the preferred means of training for most faculty members.

The diffusion and implementation process for this research study took place on the local, state, and national levels. At El Camino College, the diffusion process consisted of presenting final copies of the study results to (1) the President and Vice-President of Instruction; (2) the departmental deans of instruction; (3) staff development officers; and (4) the College Academic Senate. Interested individuals will receive a briefing based upon the findings of this study with a special emphasis on the recommended strategies needed to overcome the barriers to self-directed computer training.

The implications for improvement of educational practice arising from this Major Applied Research Project are that a long-standing problem in the computer-literacy training of

faculty at El Camino College can be solved. It is expected that many of the results and recommendations, concerning the structure of self-directed computer training obtained in this study will be applicable to other community colleges across the nation. Sample survey instruments and computer-usage questionnaires are presented in Appendix A, B, and C. Examples of faculty development computer-training programs are given in Appendix D and E. An extensive bibliography on the subject of self-directed computer training for college faculty is also included.

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Chapter 1

INTRODUCTION

The rapid development of computer techonology in the 1980s has confronted higher education with a number of problems. In the decade of the 1990s, there will be even greater challenges, particularly in meeting the need for increased computer-literacy among faculty members, information manipulators, and information consumers of all kinds.

The spread of computing in higher education during the last decade was driven by the introduction of the personal computer. The unit cost of a personal computer was low enough so that purchase decisions could be made by the deans of instruction. Budgetary changes could be made within local departments without the campus administration realizing how fast things were happening. In the coming decade the computer revolution will continue as costs decrease, speeds increase, and software takes more advantage of existing hardware capabilities (Naisbitt, 1984). Computers will cease being merely a useful tool for scholarship, and will become the principal tool. Access to library materials, to scientific databases, and to personal computers will become essential in order for college faculty to

function effectively in future educational environments (Naisbitt, 1984) and (Moravec, 1988).

Statement of Problem

Discussions with the deans of instruction of El Camino College, in Torrance, California, pointed out a perceived need to develop self-directed programs for training faculty in the use of computers. There was little necessity to convince computer-literate faculty to use microcomputers in their educational activities. However, among faculty who were not computer-literate, it was difficult to make them see the usefulness of microcomputers, or to convince them to take advantage of the existing staff development programs in computer training. Developing self-directed programs in computer training and basic computer-literacy turned out to be the answer to this problem.

The creation of self-directed programs in computer training by various means was discussed at some length with deans of instruction and faculty members at El Camino College. It was the general belief of these educators that potential obstacles or barriers to self-directed learning with microcomputers needed to be identified in order to facilitate self-directed computer training. In addition, strategies designed to overcome these obstacles had to be identified. El Camino

College faculty were of great assistance in this study by answering the survey questionnaires in a responsive manner.

Appendix D contains an example of a recent staff development program at El Camino College. This recent program included sessions in computer-literacy training along with demonstrations of new instructional technology such as videodisc, CD-ROMS, and new computers. Full-time faculty were required to accumulate 5.5 credit hours during the first day of the staff development program workshops, and six credit hours on the second day attending workshops and division departmental meetings. Part-time faculty were required to accumulate three credit hours during the evening of the first day (Appendix D).

In spite of these mandatory credit requirements, computer-literacy still remains a problem among faculty and staff, perhaps due to the traditional nature of these workshops which are given as classes scheduled at specific times. Another problem with the current staff development program described in Appendix D is that computer-training and computer-literacy programs constitute only a small percentage of the workshops or sessions. This dilutes the importance of computer training in the minds of many faculty members. There is also a lack of opportunity for hands-on work with the computer which precludes learning of a permanent nature. The existence of these obstacles led to a need for this study of self-directed computer training.

An innovative self-directed program for computer learning was presented during the 1990 Nova University Summer Institute at

Fort Lauderdale, Florida by Sidney Sytsma of Ferris State University, Michigan. Ferris State University has established the Timme Center for Teaching Excellence as a year-round, campus-wide vehicle for promoting self-directed innovation in teaching and instruction. The Ferris State program goes far beyond basic computer-literacy. Faculty members are awarded stipends, a modest supply and equipment budget, and released time from teaching to produce computer-assisted instructional (CAI) modules.

These modules may include interactive, computer-controlled video. The faculty members who have CAI proposals selected are provided with a personal computer and video disk controller, along with a choice of several university-supported authoring systems for use in creating CAI modules. The recipients of the Timme grants provide a core of expertise, and serve as enthusiastic supporters of utilizing new instructional technologies on a self-directed basis in their own disciplines. The Ferris State University Timme Center is one possible model, given in Appendix E, for the implementation of a self-directed computer training program in the new information and computer technologies.

A recent survey on computer-literacy showed that less than fifty-two percent of the faculty in all subjects are computer-literate. The conclusion was that teachers believed that technology has a place in the classroom. Nevertheless, the latter have to be given the training to use the equipment for personal use or as a teaching instrument (Futrell, 1989).

Background and Significance

Self-directed computer training was a natural solution to the problem of improving computer-literacy among college faculty. A significant finding from research in adult learning is that when adults learn new methods or concepts, they are generally self-directed in their learning (Knowles, 1978:181). Knowles expresses the opinion that evidence has accumulated that when adults learn as a result of their own initiative, learning is comprehensive and more permanent than when taught by traditional formal classroom methods. Knowles points out that there is overwhelming psychological research demonstrating that a primary characteristic of adults is the need and capacity to be self-directing in their own learning.

Past researchers have indicated that the first step in computer-literacy training is to provide a non-threatening environment where the computer's educational potential can be shown (Turner,1988). Another important part of self-directed computer training is to incorporate ready access to microcomputers that are available to take to the classroom or to take home (Helms, 1987). These are both aspects of the self-directed approach to computer training that were investigated in this Major Applied Research Project (MARP).

It is important to realize that in the next decade computer training of faculty will have to become a continuing

process due to the expected rapid advances in computer technology. By the year 2000 the total amount of knowledge will increase at least ten times over the present. Computer power per dollar (cost-effectiveness) will continue to increase exponentially, while absolute computer size and cost will continue to decrease. Human-intelligent, ten teraops (10 million million operations per second) computers are projected to be available sometime during the first decade of the next century (Hans Moravec, 1988). Among other features, according to Moravec (1988), these computers will be capable of real-time automatic language translation, thus helping to solve the multi-lingual commmunication problems of minority students. Improvements in remote teleconferencing technology will permit decentralized self-determined education and make education more cost-efficient than at present (Naisbitt, 1984).

Major Issues

The major issues of this research study were to establish the existing computer-literacy levels among faculty members, and to determine the need for self-directed computer training programs at El Camino College. The principal obstacles to self-directed computer training were identified, along with strategies designed to overcome these obstacles.

Lengrand (1986:220) believes that new technologies lead to different behavior patterns. If people are to enjoy the

benefits of changing technology they must adjust to new ways. Higher education is frequently called upon to help students adjust to changes in technology. Colleges and universities are now called upon to help faculty adapt to the demands of the computer and information revolution. However, no previous research has been conducted that focuses on self-directed computer training for faculty members of El Camino Community College. This Major Applied Research Project has helped to fill this perceived need.

Research Questions

The research questions that were answered in this Major Applied Research Project are

(1) What are the major obstacles to self-directed computer training for faculty at El Camino College?

(2) What strategies should be used to overcome these obstacles?

(3) What are the computer skill levels and willingness to take formal computer training programs versus self-directed training, for math/science and humanities faculty at El Camino College?

(4) How many college faculty in the groups identified in the previous question 3 learned their computer skills on their own?

(5) How should a self-directed computer training program be structured?

Purposes of Study

The purposes of this study were (1) to establish existing computer-literacy levels among faculty members at El Camino College; (2) to determine the principal obstacles to self-directed computer training, along with strategies designed to overcome these obstacles; and (3) to develop recommendations concerning the structure of self-directed, computer-training programs for faculty at El Camino College.

Definition of Terms

In order to eliminate potential confusion on the part of the reader, the following definitions are provided for easy reference. Wherever possible operational definitions that are performance-based will be used to facilitate the analysis of data. Terms that may be ambiguous or are given meanings other than ordinary usage are defined in this chapter.

Barriers or Obstacles to self-directed computer learning have identical meanings in this Major Applied Research Project: A physical or cognitive structure (or lack of structure) that hinders learning or progress towards a desired goal (in this case achieving computer-literacy).

Computer-literacy is the ability to turn a computer on or off, load and save data to and from a floppy or hard disk, and do simple word processing or accounting. In its higher levels computer-literacy includes the ability to operate spreadsheet and database programs, to interface with other computers using a modem, and to write simple computer programs using a higher-level language such as BASIC, Fortran, or C.

The Delphi technique is a method for the systematic collection of judgments on a particular topic through a set of carefully designed sequential questionnaires and summarized information with feedback of opinions obtained from earlier responses. The Delphi technique was developed by Dalkey (1967) at the Rand Corporation in Santa Monica, California.

Nominal Group technique is a structured group meeting proceeding along a set format. The Nominal Group technique was developed by Andre L. Delbecq and Andrew Van de Ven in 1975.

Respondent Group is a group whose judgments are being solicited and who are asked to respond to a questionnaire.

Self-Directed Learning is a process in which individuals take the initiative, with or without the help of others, in diagnosing their own learning needs, formulating learning goals, identifying human and material resources for learning, choosing

and implementing appropriate learning strategies, and evaluating their own learning outcomes (Knowles, 1975:18). The restricted sense in which the term is used in this MARP is the learning of computer skills on one's own with one's own computer at times of personal choosing, and with minimal assistance from instructional staff when help is required.

Assumptions

For purposes of this study, the following assumptions were presumed to be true:

(1) The Computer Usage Questionnaire in Appendix C provides a valid and reliable measurement of computer-literacy. The validity and reliability of this survey instrument were established in a previous study (Pomeroy, 1990).

(2) All respondents to this study will have the knowledge necessary to respond accurately to the questions asked.

(3) The Delphi questionnaires will be completed by the people to whom they are sent.

(4) The computer-usage questionnaires will be completed by the people to whom they are sent.

(5) A ninety-five percent confidence level is adequate for all statistical hypothesis testing in this study.

Limitations

The study was limited to sample populations that were drawn from two groups of faculty (math/science and humanities) and did not include teachers of other disciplines such as vocational education or nursing.

A second limitation was that the sample populations were drawn from El Camino Community College faculty. Therefore, the results of this study might not necessarily apply to other community colleges or other areas of the country.

The study was limited by the willingness and ability of the respondents to answer candidly and accurately. For the sample size used (twenty-five respondents in each group) and a ninety-five percent confidence level there was a five percent probability that the alternate hypothesis was accepted when it was false. Note that a larger sample size would increase the confidence level (Isaac and Michael, 1987).

Chapter 2

LITERATURE SURVEY

This review of the literature contains four distinct areas. The first topic concerns the rapid rise of computer technology over the last forty years, and provides the basis for the current ascendancy of computer technology as well as the rapid evolution of the personal computer. The second topic deals with some present educational uses of computer technology in which a broad spectrum of computer applications is described and discussed. The third discussion involves computer-literacy considerations for college faculty in which the need for basic computer-literacy training for college faculty is established. Finally, topic number four deals with self-directed, computer training for college educators. In this section the general theory of self-directed adult education is reviewed, and some specific characteristics of self-directed computer-literacy training for faculty members are discussed.

The Rise of Computer Technology

Electron tube computers made their appearance after World War II. The first commercially available machine of this kind was UNIVAC I, whose initial customer was the Census Bureau in 1951.

By the end of the 1950s there were over 6,000 vacuum tube-type digital computers in operation. Mainframes of this sort were to become known as the "first generation" of computers. An example of a first generation computing machine is the IBM 650 (vacuum tube) with a memory of one-thousand 40 bit words, and a computing power of 1,400 operations per second (Rosen, 1971).

Beginning in the early 1960s a second generation of mainframes appeared that made use of the newly developed transistors instead of vacuum tubes. Transistor-based computers were smaller, cheaper, more reliable, and used less electric power than vacuum tube computers. The fastest example of a second generation mainframe computer is the CDC 7600 (transistor) with a memory of one-million 64 bit words, and a computing power of ten-million operations per second (Rosen, 1971).

By 1970, IBM introduced a third generation of computers using "hybrid integrated circuits." These hybrid chips soon gave way to "monolithic intergrated circuits" in which dozens of components were etched directly onto silicon chips a few millimeters square. Integrated circuit technology evolved and by 1975 a chip contained thousands of components. These computers were soon eclipsed by the microprocessor, a chip with tens of thousands of components that was actually a complete computer in itself. The IBM 360 is an example of a hybid chip mainframe computer that enjoyed widespread use in industry, government, and the academic community.

An example of a post-third generation machine is the Cray-1 (integrated circuit) supercomputer with four million 64 bit words, and a computing power of fifty million operations per second (Dertouzos et al., 1979; Cale et al., 1979). Post-third generation supercomputers include the 312-billion operations per second Cray-2 (1985), and the gallium arsenide chip-based Cray-3 (1989), packed into a one cubic foot volume, that clocks-out at the fantastic figure of 1.6-billion operations per second.

Advances in computer technology have now become so rapid that computer scientists no longer give names to various generations of computers as they did in the past. As an example of this progress, Hans Moravec (1988) estimates that personal computer systems capable of present Cray supercomputer performance will be available during the first decade of the next century for only $2,000.

Tiny and cheap microprocessor chips are what make the personal computer possible--a small computer for personal and home use, with the power of a mainframe, at an affordable price of only $2,000 or less. By the end of the 1970's the Apple, TRS80, and Commodore Pet personal computers made their appearance. These small machines were as powerful as mainframes of the early 1960s, such as the IBM 7090 at less than one-thousandth the price. Where the popular IBM 7090 mainframe in the 1960s cost about $10,000,000, Radio Shack's personal computer the TRS-80 cost under $2,000 in the late 1970's. By

1987, Apple Computer's Mac II personal computer achieved the power of a Vax 11/785 minicomputer, or a third generation IBM 360 mainframe, at an affordable price of $3,000 (Queisser, 1988).

Educational Uses of Computer Technology

Some important present applications of personal computer technology to education are as follows:

(1) Computer aided design (CAD) is the process of using the computer to accomplish architectural or engineering design or drafting (Wood, 1982).

(2) Computer assisted instruction (CAI) is the conduct of classroom instruction through the use of computers as an instructional medium (Grady, 1983). An example of CAI is the computer program "Camelot" which is an individualized information system developed at Miami-Dade Community College. Camelot provides individualized feedback for students on multiple-choice tests, essay tests, or other assignments (Anandam, 1984). Teachers can input any statements appropriate for a given answer, a given type of student, or select a particular level of learning. They can also receive summaries from "Camelot" of group or individual progress (Anandam, 1984).

On the negative side, the researchers Lewis, Dalgaard and Boyer (1984) find that computer-assisted instruction is not

very cost effective. Computer-assisted instruction or CAI has not turned out to be the revolutionary panacea that some expected. Meta-analyses by Kulik and Kulik (1986 and 1987) showed that computers make only small contributions to achievement compared with traditional instructional methods. Nevertheless, as computer hardware and software costs decrease over the decade of the 1990s, CAI will probably continue as a common feature of the educational environment.

(3) Computer managed instruction (CMI) is the use of the computer as a management tool for maintaining records, or administering and recording test information (Dennis, 1983; Cloutier, 1985; and Helms, 1987). Recent demands for educational accountability have generated the need for excessive amounts of paperwork as well as increased record keeping. Joiner, Miller, and Silverstein (1983) find that use of the computer as a management tool makes this excessive record keeping possible. Studies by Bracey (1983) and Walla and Wendel (1983) show that CMI programs handle student data significantly better than older hand-gradebook methods. A rapidly developing area of CMI is electronic mail (Petrosky, 1985). Electronic-mail access to major libraries allows a teacher to obtain reports and books directly, simplifying the process of library research. This capability alone is a strong motivator for faculty members to become computer-literate (Johnston, 1985).

(4) Computer-assisted library searches of various databases (such as ERIC) use computers to locate all references dealing with a particular subject, or by a particular author (among many other possibilities) (Galloway, 1984; Wedman and Strathe, 1984).

(5) Word processing is considered by most researchers to be the most significant computer skill for a college teacher to have (Cole and Riser, 1987; Schwartz, 1985; and Cloutier, 1985). College teachers are expected to publish, and computer-based word processing simplifies the task enormously over traditional typewriter techniques (Brown, 1988). Word processing computer skill enables a teacher to create course outlines, and textbooks by means of "desktop publishing" techniques (Galloway, 1984; and Turner, 1989). The computer-literacy requirements for desktop publishing and word processing are discussed in more detail in the next section.

(6) Hypermedia and Hypercard are recent developments in personal computer technology that provide new methods for writing software and accessing large databases by means of videodisk and CD-ROM technology (Brown, 1988; Goodman, 1988). Hypermedia is the IBM PC-based system, while Hypercard is the Apple personal computer version of the authoring language. Basically, Hypermedia and Hypercard permit the user to generate videodisk and CD-ROM

control software using standard English language commands, and information to large databases without any knowledge of programming languages.

Computer-Literacy Considerations

Watt (1983:106) sums up the importance of future computer-literacy for educators as follows: "It is hard to imagine students becoming computer-literate without computer-literate teachers." Durbak and Sadnytzky (1984) state in the following quote:

> It is no exaggeration to say that most of the nation's college faculty is dysfunctionally computer-illiterate; primarily, because the technology is significantly different from that of the traditional tools of the scholar and teacher--the pen, the pad, and the text (Durbak and Sadnytzky, 1984:7).

Unfortunately, a recent survey on computer-literacy shows that less than fifty-two percent of the faculty members are computer-literate (Futrell, 1989). The above considerations taken together point out the need for better computer-literacy training for college educators.

Most researchers are in agreement that computer-literacy involves both hardware and software literacy. Hardware computer-literacy is the psychomotor skill of basic computer operation. It consists of the ability to turn the computer on or off, insert or eject diskettes from the disk-drives, and load or save computer programs or data files on a diskette. Hardware computer-literacy

is considered to be the first most important skill for computer users to have (Helms, 1987; Levin, 1983; Merbler and Lawver, 1983; and Stecher, 1987).

Software literacy is the ability to use and/or write computer programs necessary to accomplish a specific task. The basic software literacy of word processing is considered by nearly all researchers to be the second most important computer skill that a teacher can have (Cole and Riser, 1987; Dellow, 1985; Schwartz, 1985; and Stecher, 1987); it is second only to basic hardware literacy. College level faculty are often expected to publish as a part of their professional duties. Word processing via computer greatly simplifies this process and requires much less time than traditional typewriting methods.

It is predicted that more technological change will occur over the next ten years than in all recorded history (Moravec, 1988). Teaching these new technologies poses a problem not only to the college educator, but to the publisher as well. Technology is changing so rapidly that before a text on the new technology reaches the bookstore it has become obsolete.

In the future desktop publishing will allow educators to change the writing and publishing process so that new technologies can be taught in a timely fashion (Sytsma et al., 1990). Desktop publishing provides an example of various levels of computer-literacy skill requirements.

Sytsma, Octernaud, and Hobart (1990) break down these requirements into different levels: On an entry-level, a

personal publisher is able to use a microcomputer-based processing program with a laser printer. The word processor can mix proportional fonts and produce quality documents. However, this system will not provide the control over type and image placement offered by desktop publishing programs. There are many character-based word processors that can produce quality documents when used with a laser printer. The most popular word processors such as WordPerfect, Microsoft Word, and WordStar function very well in conjunction with a Laser Printer. Even the most popular shareware word processor, PC-Write, does a credible job with a laser printer. However, these programs are not substitutes for higher-end desktop publishing.

On the mid-level, a personal publisher is able to perform page-layout functions. The traditional cutting and pasting of publishing is performed graphically on the computer screen. Text and graphics from many sources can be combined to produce serviceable materials. The weakest link in this system is the printer which has a resolution of 300 dots per inch. This system can perform all the functions of the high-level system but at slower speeds and with less print resolution.

There are two software packages that are primary competitors in the desktop publishing arean. They are Aldus PageMaker and Ventura Publisher. PageMaker is known for better control of type placement and spacing while Ventura has a reputation of being the best for large consistent projects. This software is difficult to learn to use, since there are literally

hundreds of commands. Becoming competent in PageMaker is at least as difficult to master as Lotus 1-2-3. Desktop publishing software is not designed to be used in place of a word processor. Sytsma et al. (1990) recommend that if formatting and printing needs can be handled by a word processor, then word processing should be used and not desktop publishing.

High-end personal publishing performs no new functions over a mid-level system; however, it performs the desktop publishing functions faster and better. The computer can load programs, place graphic images, move text, and redraw the screen faster than the other systems. The printer can print faster and at higher resolution than the printers with the other systems. These systems are expensive ($12,000 compared to $5,000 for a mid-level system). They are designed for commercial publishers and are so difficult to learn that they are only used by professional publishing houses.

One basic computer-literacy skill that does not enjoy universal acceptance among educational researchers is computer programming ability. Only one-half of the experts believe that it is essential (Leuhraman, 1983; and Young, 1985). The other half believe that a knowledge of programming is not essential for computer-literacy (Dunn, 1985; and Helms, 1987). Some researchers who oppose the programming requirement for computer-literacy cite the analogy that a person can drive a car without knowing how the engine works (Molnar, 1983). In the same way, an educator can use a computer program without knowing how the software operates.

Self-Directed Computer Training

In this section the general theory of self-directed adult education is reviewed. After this review, some specific characteristics of self-directed, computer-literacy training for college faculty are discussed. Malcolm Knowles presents the theory and practice of the field of adult education, with procedures outlined for the specific implementation of his basic concepts. Knowles (1975) lists the major differences between adults and children which have a direct bearing on the structure of adult learning processes. These are

(1) Differences in self-concept

(2) Differences in experience

(3) Differences in readiness to learn

(4) Differences in orientation to learning

In order to structure computer-training to accomodate the adult learner it is necessary to make use of the model developed in Knowles' Self-Directed Learning (1975). As Knowles points out, teachers tend to structure learning experiences around their assumptions about the learner, and get results which tend to confirm their initial assumptions. Educators must make some postulates in order to facilitate adult learning:

(1) My participants are independent and possess a drive and motivation to learn, grow, and develop.

(2) It is essential to design learning experiences which are more challenging, less structured, and less formal.

(3) Participants' learning will be more open-ended and less controlled by the instructor and the environment; it will tend to be less compartmentalized and more adaptable to changing conditions.

(4) The participants will exhibit increased independence, more drive and motivation to learn on their own and will become less dependent on others.

The features which characterize positive learning experiences relate directly to the assumptions made about adult behavior and learning. These would include the following: (1) participants are increasingly independent self-directed personalities, (2) participants possess valuable experiences which can be used as rich resources for learning, (3) they perceive that readiness to learn flows from a real-life focus, and (4) they are motivated to learn through internal incentives, curiosity, and the desire for self-fulfillment.

Most adults, in contrast to children, see themselves as independent, self-directed individuals, and resent classroom situations that cast them in the role of dependent or other-directed trainees. Learning goals that are established

solely by the teacher or set as requirements of a module or package, tend to result in lowered motivation, a shortened attention span, and decreased interest in learning. Course activities that are heavily topic-oriented, rather than task - or problem-focused, often make it difficult for participants to apply the material to everyday, on-the-job situations. After all, on-the-job situations take the form of tasks and problems, not topics. The more the computer training course is oriented to faculty situations, problems, and needs, the more extensive will be the retention and application of learning.

A primary characteristic of effective adult learning is self-directed education. Self-directed learning is primarily associated with the works and research of Malcolm Knowles, who defined self-directed learning as follows:

> A process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975:18).

Research in self-directed learning has been a primary area of adult education research during the last decade (Brookfield, 1984:59). The direct focus of research into self-directed learning is, not surprisingly, the individual learner. In the attempt to present a realistic definition an almost exclusive emphasis has been placed on the individual aspects, and isolated nature of such learning (Brookfield, 1984:66).

Brookfield's emphasis on self-directed learning as conducted by the individual learner has meant that subsequent research findings presented the individual learner as a creative conductor of learning. Within the scope of present research on adult learning it appears that the traditional process of adult education, that of sitting in a classroom with a teacher directing activities, is misdirected. Current research shows that adults, by themselves or with peers, can do much of their own educational planning in the absence of a professional teacher (Verduin, Miller, and Greer, 1986:96).

Mezirow (1985:142) expressed the opinion that it is useful to think of learning as the extension of one's ability to make explicit (spell out), contextualize (make associations within a frame of reference), validate (confirm), and act (perform) upon some aspect of one's engagement with the world. Learning always involves making explicit, elaborating, and contextualizing judgements. Learning may involve validating performance as well (Mezirow, 1985:142).

Knowles (1975) stated the need for an orientation experience to help make the transition to self-directed learning:

> Adults have been so conditioned by their previous elementary and secondary school experiences to see the role of learner as a dependent role that they almost always resist taking responsibility for their own learning in formal instructional situations (but not in real-life situations). Accordingly, they need to have an orientation experience to help them make the transition from dependent to self-directed learners (19).

Past research has viewed self-directed learning from two separate perspectives. Research in the 1970s viewed self-directed learning as a process where the learner assumes primary responsibility for planning, implementing, and evaluating a learning experience. The second viewpoint moved away from descriptive learning projects toward methodologies that attempt to build a theoretical framework for understanding self-directed adult learning (Brockett, 1985:211).

Two early 1980s studies, utilizing a qualitative approach to self-directed learning, make important contributions to this theory-building process. Gibbons, et al. (1980) found that self-directed individuals share a number of similar characteristics. These are apparently related to the concepts of self-directedness, such as primary experience in the area of expertise, industriousness, perseverance, curiosity, creativity, and self-discipline.

Another relevant study completed by Brookfield (1981) reported that interviewees felt that their learning involvement was an on-going rather than a short-term affair that transcends the boundaries of traditional subject areas. The interviewees felt themselves part of a network or "fellowship of learning" characterized by both a willingness to share one's expertise with other learners, and a desire for recognition through competitive success in their field of endeavor (Brookfield, 1981:26).

With regard to computer training for college educators, Turner (1989) demonstrates that it is important to provide faculty members with a relaxed environment where the educational potential of microcomputers is demonstrated. Killian (1984) concurs that a conducive environment plays a major role in encouraging teachers to upgrade technological skills. Virtually all successful computer training programs require that the faculty participant has a personal computer to practice on (Lindbeck, 1982; Walla and Wendel, 1983). At most a maximum of no more than two people to a machine is recommended (Irvine, 1983).

Once the usefulness of microcomputers is made clear to college educators, the educators need to learn how to use the computer in an adult-centered educational environment in order to reduce anxieties (Wedman and Strathe, 1984). Most computer training programs for faculty members fail to take into account androgony and the instructional needs of adult faculty members. It has been shown that solely traditional, content-centered classroom courses rarely work (Wedman and Strathe, 1984).

Faculty must be given ample opportunities for practice at a time and place of their own choosing until basic computer-skills are developed (Helms, 1987). Besides providing computer laboratories for practice with their peers, faculty members should be able to take personal computers home whenever it is financially possible (Austin, 1988; Helms, 1987).

Computer-literate faculty can themselves provide the talent required for a successful self-directed computer training program for non-computer-literate faculty. Pomeroy (1990) found that of the whole population of vocational/technical teachers surveyed in southern Nevada postsecondary schools, forty-eight percent were computer-literate while fifty-two percent were non-computer-literate. The cohort of computer-literate faculty can then become the facilitators that assist other faculty to acquire computer skills (Carlson and Berger, 1988). Even in faculty-workshop type training programs, the trainers should be colleagues and not outside computer professionals (Austin, 1988; Pantiel, 1985).

Pomeroy (1990) further reported that the largest source of vocational teacher computer training among computer-literate postsecondary faculty in southern Nevada is self-instruction at a level of sixty-two percent. This finding strongly suggests that not only is self-directed computer training indeed possible among faculty members, but that self-directed training is the principal means of faculty learning new computer technology. An implication is that greater emphasis should be given to the removal or the overcoming of barriers to such self-directed computer training.

An important first strategy must be to help in overcoming the barrier of faculty resistance and anxiety about using computers. Issa (1989) and Spero (1982) use the term "computer

anxiety" to describe this adult apprehension to the use of computer technology. Some researchers find that faculty members are much more "computer anxious" than students (Brown, 1988; Issa, 1989).

Many faculty members feel threatened by computer technology (Jalbert, 1986). Such faculty correctly believe that college education will be changed by the computers, and they are afraid that they might lose their positions (Waldrop and Adams, 1988). Some colleges presently use computer-literacy as a criterion for tenure and promotion, and most will do so in the near future (McCord, 1984). Faculty must be involved in shaping a college's computer-literacy policies or else the teachers will feel threatened by the computer (Winans, 1985).

Researchers suggest several strategies for overcoming "computer anxiety." Educators must learn by practical examples that the use of computer technology will increase their productivity while reducing rote-routine (Johnston, 1985). Dellow (1985) found that teachers become less resistant to the application of computer techonology after they are shown the ease of use, and new opportunities for improving education that the computer makes possible.

Literature Review Summary

The development and growth of the personal computer at the end of the 1970s was intimately associated with self-directed

computer training through the medium of computer users/support groups. These computer users groups were organizations that held regular meetings for puposes of exchanging information on both software and hardware developments for a particular personal computing machine. The first of such groups was the 1975 Altair computer users group in Silicon Valley, California, out of which sprang Jobs' and Wozniak's Apple Computer along with many associated computer users groups. By 1977 a number of Radio Shack TRS-80 users groups were organized, followed by Commodore Pet users groups. These users groups spread rapidly across the country, which greatly increased the popularity and usefulness of personal computers, and permitted individuals to learn how to use a computer on their own without ever taking a formal course. Based on this history, the formation of computer users groups, among interested faculty members on a divisional or departmental basis should be a good strategy for facilitating self-directed computer training.

The requirement for computer-literate faculty can only increase during the next decade, with the rise of the information society and exponentially-increasing computer performace (Naisbitt, 1984; Moravec, 1988). The fact that only half of the nation's college educators possess basic computer-literacy lends urgency to the drive to increase the percentage of computer-literate faculty.

Most existing computer-literacy training programs for college level faculty fail to take the principles of androgony

into account. Self-directed computer-literacy training is a natural solution to this problem. Researchers have reported that self-instruction is the largest source of computer-training (sixty-two percent) among those faculty members who are computer-literate (Pomeroy, 1990). This cohort of computer-literate faculty can then be used to form the nucleus of a mentor group which will help to train the rest of the faculty.

Finally, it is important to remember that faculty members must be involved in shaping a college's computer-literacy policies--or else they will feel threatened by the computer, and will look on the computer as an enemy rather than as a friend. Deans of instruction should carefully consider the special needs and requirements of their departments before implementing any new program in computer-training for faculty members.

Chapter 3

PROCEDURES AND METHODOLOGY

Samples and Procedures

The samples and procedures that were used to answer the research questions posed by this study were as follows:

(1) Use the Delphi technique, developed at the Rand Corporation by Dalkey (1967), with twenty-five computer-literate professionals in higher education at El Camino College, to identify the top seven high-priority obstacles to self-directed computer training. The sample used in this step consisted of the following educators: ten division deans of instruction, five Computer Science or CIS instructors, five mathematics/science faculty, and five humanities faculty.

(2) Use the Delphi technique again with the same twenty-five professionals identified in the previous step (1) to develop the top three strategies needed to overcome each of the seven obstacles to self-directed computer training identified previously in step (1).

(3) Determine by the survey method the computer skill levels of two groups of El Camino faculty, and the relative willingness

of the groups to take formal computer training versus self-directed training. The first group consisted of twenty-five randomly selected math/science faculty, and the second group consisted of twenty-five randomly selected humanities faculty members. The null-hypothesis, that there is no significant difference in computer literacy between the two groups of college faculty, was then tested at the ninety-five percent confidence level.

(4) Conduct a literature review which provided not only useful information from similar projects and research methodologies, but added to the list of barriers and top-ranked strategies needed to overcome the impediments to successful self-directed computer training for community college faculty.

(5) Use the results obtained in steps (1) through (4) to create recommendations for developing, implementing, and evaluating self-directed computer training programs at El Camino College.

Instruments

The Delphi technique (Dalkey, 1967) was used to accomplish steps (1) and (2) of the above procedures. This technique, unlike many other forecasting methods, does not have to produce one answer as its final output. Instead of reaching an agreement, the Delphi technique leaves a spectrum of opinions, since there is no attempt to reach unanimity. The

objective of the Delphi technique is to reduce the range of responses as much as possible without biasing the respondent. Justifiably different opinion is allowed by this approach (Wheelright and Makridakis, 1973; Kintzer, 1977). Over the years, the Delphi technique has gained recognition as one of the best methods of seeking out information which may generate a consensus among members of a respondent group without exerting undue external pressures to conform.

Appendix A contains the Delphi survey questionnaire used in the first iteration to establish the major obstacles to self-directed computer training for faculty at El Camino College. The use of the Delphi technique involved two iterations of questionnaires with feedback to the respondents. A study team developed an initial questionnaire (Appendix A), and the researcher distributed it personally to the respondent group. The respondents then completed the questionnaire and returned it to the researcher.

The responses to the first questionnaire were summarized, and used to develop a second questionnaire (see Appendix B) containing the obstacles to self-determined computer training that were identified by the respondent group as being the most important. The respondent group was then asked to rank the top priority obstacles in the second questionnaire as to the order of importance. Finally, a list of the top seven obtacles was produced using the data from the second questionnaire.

In a similar manner, the Delphi technique was used again

with the same respondent group to develop the top three strategies needed to overcome each of the seven obstacles to self-directed computer training that were ranked previously. Two iterations of the Appendix B Delphi questionnaire, with feedback to the respondents, were used to determine the top strategies.

Appendix C contains the computer usage survey questionnaire that was used to determine faculty computer skill levels, and faculty willingness to take formal computer training programs versus self-directed training for two different groups of El Camino College educators. The first group consisted of twenty-five randomly selected math/science faculty. The second group consisted of twenty-five randomly selected humanities faculty.

The questionnaire was developed by James Pomeroy (1990) in his Nova University Major Applied Research Project. Objective validity of the questionnaire was established by the following higher educational research specialists: Dr. Muin Mustafa, computer science professor at University of Nevada; Drs. Al Mizell and Warren Groff of Nova University; and Dr. Albert Pautler of the University of New York.

Treatment of Data

In this segment of the investigation the null H0 and alternative H1 hypotheses was tested. The null hypothesis H0, that there was no significant difference in computer-literacy

between the math/science and humanities faculty groups, was Chi-square tested at the ninety-five percent confidence level. The alternative hypothesis H1 was that there was a significant difference in computer-literacy between the two selected groups of faculty members (Isaac and Michael, 1987).

Statistical data from the Appendix C questionnaire on the computer usage of faculty members were used to determine the computer-literacy levels, and willingness to take formal versus self-directed computer training for El Camino College faculty. Computer-literacy was determined by means of the responses to the first four questions on the Appendix B survey instrument that dealt with faculty computer skills.

Questions one and two on the survey in the SKILLS AREA of Appendix C dealt with basic computer skills that were considered necessary to establish computer-literacy. Affirmative answers to all four questions in the SKILLS AREA part of the questionnaire were required in order for computer-literacy to be established. Demographic data from the survey concerning both age and gender were compiled, as related to computer-literacy or non-literacy, and were presented in tabular form. Before this study was conducted, advanced faculty age was considered by some deans of instruction to be correlated with low computer-literacy levels.

Chapter 4

PRESENTATION OF RESULTS

Introduction

The main purposes of this study were (1) to establish existing computer-literacy levels among faculty members in two different groups; (2) to determine the principal obstacles to self-directed computer training, along with strategies designed to overcome those obstacles; and (3) to develop recommendations concerning the structure of self-directed computer training programs for faculty at El Camino College. This study used two iterative Delphi process instruments (Appendices A and B), and one computer usage survey questionnaire (Appendix C).

The first of these processes made use of the Delphi technique to produce a summary of the top seven major obstacles to self-directed computer training programs for local faculty. The second process used the Delphi technique to produce a summary of the recommended top three strategies needed to overcome each of the seven major obstacles to self-directed computer training. A group of twenty-five computer-literate professionals in higher education comprised the survey group in both cases. Finally, two different faculty groups were surveyed, using the computer survey

questionnaire in Appendix C in order to identify both the perceived need for self-directed computer training, and the relative willingness of the faculty groups to take formal versus self-directed computer-literacy training.

Obstacles Identified

The Delphi technique used in this segment of the study involved two iterations of questionnaires with feedback to the respondents. Questionnaire #1 in Appendix A identified fifty-three different barriers to self-directed computer training at El Camino College. Similar obstacles were then combined to produce a list of twenty-one obstacles which were then fed back to the respondent group for selection of the seven top-ranked obstacles.

All respondents were asked to select seven obstacles that they thought were the most important in preventing self-directed computer training for El Camino College faculty. Participants were also asked to rank the obstacles in descending order of importance from one to seven. All twenty-five respondents in the survey group completed the questionnaires. This process took about four weeks to complete using both campus mail delivery and personal contact. The final result was an ordered priority list of seven obstacles as shown in Table 1, with the highest priority obstacle ranked first, and the least important obstacle ranked last.

Table 1

Obstacles to Self-Directed Computer Training Identified by the Delphi Technique

Appendix A Questionnaire

Obstacles	Rank
1. Nonavailability of personal computers.	1
2. Lack of troubleshooting assistance when needed.	2
3. Lack of interest in computers.	3
4. Lack of motivation/reward for learning to use computers.	4
5. Inability to understand written directions for use of computers or software.	5
6. Other obligations or demands on time.	6
7. Computer anxiety.	7

Seven principal obstacles to self-directed computer training for faculty were identified by the Delphi survey group at El Camino College. The principal obstacles were nonavailability of personal computers, lack of troubleshooting assistance when needed, lack of interest in computers, lack of motivation/reward for learning to use computers, inability to understand written directions for use of computers or software, other obligations or demands on time, and computer anxiety.

The seven obstacles given in Table 1 were then used to formulate the Delphi strategy survey questionnaire given in Appendix B. In the next section the strategies developed by the survey team are presented.

Strategies Developed

This segment of the study involved the determination of strategies needed to reduce or eliminate the obstacles identified in the previous segment. The same group of twenty-five computer-literate professional educators used in the obstacle survey was used to determine the top three high-priority strategies for each of the seven top-ranked obstacles. Once again the Delphi technique was used with two iterations to reach agreement. The strategy survey instrument (Appendix B) included ranked listings of the obstacles. The first iteration produced a list of thirty-three strategies variously divided among the seven obstacles. The twenty-five member strategy survey team was then asked to select the top three strategies needed to overcome each of the obstacles identified in the previous segment of the study. The entire process, involving two iterations of the Delphi technique, took about four weeks to complete. The results are given in Tables 2 through 8, where the top three strategies recommended to overcome each of the top seven obstacles to self-directed computer training are presented along with additional, lower-ranked strategies proposed by the survey group.

Table 2

Strategies Developed to Overcome Obstacle #1:

Nonavailability of Personal Computers

Rank	Strategy
1.	Allow faculty to use computer labs on campus when students aren't using them. Set up specific hours for faculty use.
2.	Make one PC available per faculty member on a permanent loan basis--given that the budget will allow it.
3.	Locate a dedicated PC in each classroom for CAI.
4.	Indicate to division deans that there is a need for more PC's.
5.	Put PC's on wish list.
6.	Provide financial assistance and wholesale prices for faculty obtaining PC's on their own.

The top-ranked strategy in Table 2 is to overcome the obstacle of nonavailability of personal computers by allowing faculty to use computer labs on campus when students aren't using them. It was recommended that specific hours be set aside for faculty use of the computer labs, when student demand is less. Secondly, it was recommended that if the budget was sufficient one PC per faculty member be provided on a permanent loan basis (as an ideal). The third-ranked and much cheaper strategy was to locate a dedicated PC in each classroom for faculty personal use

or CAI education. Lower-ranked strategies included indicating to division deans that there is a need for more PC's, putting PC's on wish list, and providing financial assistance and wholesale prices for faculty obtaining PC's on their own.

Table 3

Strategies Developed to Overcome Obstacle #2:
Lack of Troubleshooting Assistance
When Needed

Rank	Strategy
1.	Create a "buddy" system for interested faculty to share computer hardware/software experiences and knowledge.
2.	Hire a permanent computer assistant in each department/division.
3.	Publish list of faculty with various hardware/software skills.
4.	Regular departmental/division users newsletter (including problems along with solutions).

The computer survey group established that the top-ranked strategy needed to overcome the lack of troubleshooting assistance obstacle of Table 3 was to create a "buddy" system for interested faculty to share computer hardware/software experiences and knowledge. This could be augmented by

establishing divisional or departmental *computer user groups*. Secondly, it was recommended (Table 3) that a permanent staff position of computer assistant be established in each division or department (if the department were large enough to warrant it). The third-ranked strategy, to overcome lack of troubleshooting assistance, was to publish a list of faculty with various hardware/software skills (to be consulted if trouble developed). Finally, a regular departmental or divisional computer users newsletter should be established.

Table 4

Strategies Developed to Overcome Obstacle #3:

Lack of Interest in Computers

Rank	Strategy
1.	Institute staff development days with computers as topics.
2.	Establish a "buddy" system among interested faculty to help create interest among those who lack interest.
3.	Create divisional/departmental computer users groups.
4.	Institute departmental computer applications newsletter.

The strategies needed to overcome lack of faculty interest in computers are given in Table 4. Top-ranked was the inclusion of more computer seminars in the staff development

days. Second was the strategy of establishing a "buddy" system to help create interest among those who lack interest. The third-ranked strategy was the creation of divisional or departmental computer users groups. Last-ranked was a departmental/divisional computer applications newsletter to let faculty know what is being done with computer technology.

Table 5

Strategies Developed to Overcome Obstacle #4:
Lack of Motivation/Reward For Learning
To Use Computers

Rank	Strategy
1.	Give departmental awards for best CAI applications programs. Awards could be cash and/or promotional advantages.
2.	Give time-credit or pay for experienced faculty to provide assistance on CAI projects.
3.	Include computer-literacy as part of the faculty evaluation process.
4.	Provide examples of what can be done with computers.
5.	Create divisional users groups.

The top-ranked strategy in Table 5 was to overcome the obstacle of lack of motivation or reward for learning to use

computers by giving departmental awards for the best CAI applications programs. The awards could be either cash and/or promotional advantages. Secondly, it was recommended that time-credit or extra pay be given for experienced faculty to provide assistance on new CAI projects. The third-ranked strategy was to include computer-literacy as part of the faculty evaluation process. Lower-ranked strategies included providing examples of what can be done with computers, and creating user groups.

Table 6

Strategies Developed to Overcome Obstacle #5:
Unable to Understand Written Directions
For Use of Computers or Software

Rank	Strategy
1.	Make available simple one-page introductory material.
2.	Provide video-tapes for learning computer skills.
3.	Provide full-time computer assistant for each department/division.
4.	Permit interested faculty to create a "buddy" system.
5.	Provide troubleshooting assistance to reduce this obstacle.

The strategies developed by the survey group to overcome the obstacle of the inability to understand written directions for the use of computers/software are shown in Table 6. The

top-ranked strategy was to make available simple one-page introductory material on the use of new computer hardware or software. The second-ranked strategy was to provide video-tapes for learning computer skills. The third strategy was the creation of the position of full-time computer assistant for each department/division. Lower-ranked strategies included recognition that interested faculty could create a "buddy" system for using computers or software. Good troubleshooting assistance helps to reduce this obstacle.

Table 7

Strategies Developed to Overcome Obstacle #6: Other Obligations or Demands on Time

Rank	Strategy
1.	Reduce the number of hours required in class to permit faculty development of CAI programs.
2.	Limit number of people "authorized" to place demands on a teacher's time.
3.	Reduce teaching paperwork (much of it unnecessary).
4.	Teach problem solving techniques.

The number one strategy needed to overcome the obstacle of not having enough time to practice computer skills is seen from Table 7 to be the reduction of the number of hours required

in class. This reduction would facilitate the faculty development of new CAI programs. The second strategy was to limit the number of people authorized to place demands on a teacher's time (too many bosses). The last two strategies were to reduce the paperwork associated with the teaching profession, and the teaching of more efficient problem-solving techniques.

Table 8

Strategies Developed to Overcome Obstacle #7: Computer Anxiety

Rank	Strategy
1.	Increase number of computer-literacy staff development presentations.
2.	Create divisional computer users groups to share experiences with colleagues.
3.	Institute mentor or "buddy" system.
4.	Set up faculty computer-support groups in each division.

The top-ranked strategy in Table 8 is to overcome computer anxiety by means of computer-literacy staff development presentations. Second-ranked is the creation of divisional computer users groups to share experiences in learning computer skills with colleagues. Third-ranked is the institution of a

computer mentor or "buddy" system. Finally, it was recommended that computer-support or computer users groups be set up in each division.

Computer-Literacy Levels

The computer usage survey questionnaire in Appendix C was then used to obtain data concerning computer-literacy levels for two different groups of faculty at El Camino College. The first group consisted of twenty-five randomly selected math/science faculty members, while the second group consisted of twenty-five randomly selected humanities faculty members.

These data were then used to test the validity of the null-hypthesis, that there was no significant difference in the number of computer-literate faculty in the two sampled survey groups, by means of a two-tailed Chi-square test at a five percent level of significance (ninety-five percent confidence).

In Table 9 the observed numbers of computer-literate faculty are presented for both of the test groups. To be considered computer-literate all four questions in the SKILLS AREA of the Appenidix C questionnaire had to be answered in the affirmative. The number of faculty members in each group was twenty-five.

At a level of significance of .05 the critical Chi-square for the null hypothesis on computer-literacy was 3.84.

From Table 9, it can be seen that the null-hypothesis was rejected, since the Chi-square value of 4.36 was greater than the threshold or critical Chi-square value of 3.84. Thus, the alternate-hypothesis was accepted--namely, that there was a significant difference in the percentages of computer-literate faculty, between the mathematics/science division and the humanities division, at a five percent level of significance.

Table 9

Number of Computer-Literate and Non-Literate Faculty in the Math/Science Survey Group Compared With the Humanities Survey Group

Test Group	Computer-Literate	Non-Literate
Humanities Faculty	5 (20%)	20 (80%)
Math/Science Faculty	12 (48%)	13 (52%)
Total	17 (34%)	33 (66%)

Chi-square value = 4.36 Critical Chi-square = 3.84

(null-hypothesis REJECTED)

NOTE: Sample contained fifty faculty members. Percentages are given in parentheses.

As shown in Table 9, only twenty percent of the humanities faculty surveyed received perfect scores on the

computer-literacy survey, compared with forty-eight percent of the math/science faculty members. For both faculty groups taken together sixty-six percent were non-computer-literate while only thirty-four percent were computer-literate. Humanities faculty as a group had significantly lower computer-literacy scores than math/science faculty members. It should be noted that the math/science division included a number of computer science instructors in the random sample who could be expected to be computer-literate.

Self-Directed Computer Training Willingness Levels

Table 10 contains data from the Appendix C questionnaire on computer usage concerning the percentages of non-computer-literate faculty who would rather learn to use a computer on their own (self-directed) versus learning in a formal class setting (traditional). The data in Table 10 are broken down in terms of numbers and percentages for the two different test groups.

In this case the null-hypothesis was accepted, since the Chi-square value of .24 was less than the critical Chi-square value of 3.84. Thus, there was no significant difference in the self-directed computer training preference levels of non-computer-literate faculty, between the math/science division and the humanities division at the five percent level of significance.

Table 10

Self-Directed Computer Training Preference Levels of Non-Computer-Literate Faculty in the Math/Science Division Compared With the Humanities Division

Test Group	Self-Directed	Formal
Humanities Faculty	10 (50%)	10 (50%)
Math/Science Faculty	8 (62%)	5 (38%)
Both Faculty Groups	18 (56%)	15 (44%)

Chi-square value = .24 Critical Chi-square = 3.84

(null-hypothesis ACCEPTED)

NOTE: Sample contained thirty-three faculty members. Percentages are given in parentheses.

From Table 10, it can be seen that fifty percent of the non-computer-literate humanities faculty preferred to take self-directed computer training rather than formal classroom instruction. For math/science faculty the percentage was slightly higher at a level of sixty-two percent. Both faculty groups taken together had preference/willingness levels of fifty-six percent.

Data from question 6 on the Appendix C questionnaire were tabulated for both test groups in Table 11. These data indicate that a majority of seventy percent of the computer-literate

faculty at El Camino Community College learned computer skills on their own. This is in substantial agreement with the statistical results of a previous study by Pomeroy (1990) in which he arrived at a similar number of sixty-two percent.

Table 11

Type of Computer Training Used by Computer-Literate Faculty

Type of Training	Computer-Literate Faculty
2-Year College	2 (12%)
4-Year College	1 (6%)
Industry Schools	1 (6%)
On-the-Job Training	1 (6%)
Self-Taught/Self-Directed	12 (70%)

NOTE: Sample contained seventeen faculty members. Percentages are given in parentheses.

Types of computer training associated with percentages of computer-literate faculty using that type of training to obtain skills were as follows: twelve percent for 2-year college, six percent for 4-year college, six percent for industry

schools, six percent for on-the-job-training, and seventy percent for self-taught or self-directed computer training.

Demographics of Computer-Literacy

In this section, the demographics of age and gender effects on computer-literacy were combined for both test groups at El Camino College. Demographic information was compiled from the data taken off the computer usage survey questionnaire in Appendix C. The relationship between age and computer-literacy for both faculty test groups taken together is shown in Table 12 while the relationship between gender and computer-literacy is given in Table 13.

Table 12

Computer-Literate and Non-Computer-Literate Faculty Percentages According to Age Group

Category	21-25 Years	26-30 Years	31-35 Years	36-40 Years	41-45 Years	46-50 Years	51-55 Years	>55 Years
Literate	8	2	2	6	18	8	30	26
Non-Literate	10	4	6	8	20	28	16	8

NOTE: Sample contained fifty faculty members.

In Table 12 the percentages of computer-literate faculty according to age groups were as follows: ten percent were in the 21-30-year age group, eight percent were in the 31-40-year age group, twenty-six percent were in the 41-50-year age group, and fifty-six were in the over 51-year age group. In addition, the percentages of non-computer-literate faculty according to age groups were as follows: fourteen percent were in the 21-30-year age group, fourteen percent were in the 31-40-year age group, forty-eight percent were in the 41-50-year age group, and twenty-four were in the over 51-year age group. By inspection of the data in Table 12 no obvious pattern relating age and computer-literacy level emerges.

Before this study was conducted, many faculty members and division deans believed that age was a significant factor in relation to computer-literacy, in that they felt that older members were less literate than younger members. The results shown in Table 12 indicate that this conclusion doesn't appear to be justified for the two faculty groups surveyed.

Demographic data concerning age in Table 12 show that there were more faculty members in the forty to sixty-year age group than there were in the twenty to forty-year age group. Many of the older faculty members were hired in the 1960s, a time of rapid expansion at El Camino College. More "greying" of the faculty can be expected in the coming decade.

Table 13

Computer-Literate and Non-Computer-Literate Faculty According to Gender

Category	Male	Female
Computer-Literate	16 (47%)	5 (32%)
Non-Computer-Literate	18 (53%)	11 (68%)
Total	34 (100%)	16 (100%)

NOTE: Sample contained thirty-four male and sixteen female faculty members. Percentages are given in parentheses.

Table 13 displays the percentages of computer-literate and non-computer-literate faculty according to gender. There were forty-seven percent male and thirty-two percent female computer-literate faculty members. Non-computer-literate faculty included fifty-three percent male and sixty-eight percent female educators. The percentage of computer-literate female faculty members is fifteen percent lower than the corresponding percentage of computer-literate male faculty members.

Summary of Results

A major result of this study was the development of a list of the top seven obstacles or barriers to self-directed computer training by faculty at El Camino College. In addition, recommendations were formulated to implement strategies that would overcome each of these barriers. The Delphi technique was used to formulate both the list of obstacles and the top three strategy recommendations for overcoming each of the obstacles.

Application of the computer usage survey instrument in Appendix C to two groups of twenty-five randomly selected humanities and math/science faculty showed that there was a significant difference in computer-literacy rates between the humanities group and the math/science group. Only twenty percent of the humanities group were computer-literate, while forty-eight percent of the math/science group were computer-literate. A Chi-square test of the null-hypothesis gave a Chi-square value of 4.36 compared with the critical Chi-square value of 3.84 at a five percent level of significance. Thus, the null-hypothesis was rejected and the alternate hypothesis was accepted.

Regarding demographic data, no large age differences in computer-literacy appeared; however, a gender difference did show up, with women having lower computer-literacy levels than men. The reason for this was that most of the women in the

sample population were in the humanities division rather than the math/science division.

The computer usage survey brought to light two more significant findings regarding self-directed computer training. The first significant finding was that seventy-two percent of computer-literate faculty members at El Camino College learned how to use computers without any formal courses on the use of computers.

The second finding was that fifty-six percent of the non-literate faculty members surveyed would rather learn to use computers in a self-directed manner rather than take formal computer-literacy courses. The self-directed computer training preference levels of non-computer-literate faculty members, a group consisting of thirty-three math/science and humanities faculty members, were surveyed. Fifty percent of the non-computer literate humanities faculty preferred to take self-directed computer training rather than formal classroom instruction. For math/science faculty the self-directed percentage was higher at a level of sixty-two percent. A Chi-square test was performed of the null-hypothesis (that there was no significant difference in preference to take self-directed computer training rather than formal training for math/science faculty compared with humanities faculty). In this case the null-hypothesis was accepted, since the Chi-square value of .24 was less than the critical Chi-square value of 3.84. Thus, there was no significant difference in preference levels of non-computer-literate faculty between the

math/science division and the humanities division, at a five percent level of significance.

The literature survey substantiated many of the results obtained in this study. For example, researchers have reported in the literature that self-instruction is the largest source of computer training among those faculty members who are computer-literate, and that self-directed computer training is the preferred means of training for non-computer-literate faculty.

The next chapter will deal with a detailed discussion of these results. Interpretations, conclusions, and recommendations developed from the results of this study will be described and discussed. Finally, implications for the improvement of educational practice will be given.

Chapter 5

INTERPRETATIONS, CONCLUSIONS, AND RECOMMENDATIONS

In the last chapter of this Major Applied Research Project, the results obtained in chapter 4 are interpreted, conclusions are drawn, implications for the improvement of educational practice are given, and strategies for diffusion and implementation are presented.

Interpretation of Results

The first result of the application of the Delphi technique was the identification of the top seven principal obstacles that have impeded self-directed computer training at El Camino College. The twenty-five member survey group of working educators ranked the following obstacles most important: (1) nonavailablility of personal computers, (2) lack of troubleshooting assistance when needed, (3) lack of interest in computers, (4) lack of motivation or reward for learning to use computers, (5) inability to understand written directions for use of computers or software, (6) other obligations or demands on time, and (7) computer anxiety.

All seven obstacles seemed to fit into one of the four categories reported by Darkenwald (1984): situational, institutional, informational, or psychosocial. The obstacles identified by this survey related to the adult learner's life situation, institution of work or learning, informational aspects of the environment, or psychosocial needs.

In the situational category, obstacle 6 (other obligations) can be viewed as factors that relate to a learner's life situation. The institutional category includes obstacle 1 (nonavailability of personal computers) as barriers arising from the learning institution itself. The informational category includes the two obstacles: (2) lack of troubleshooting assistance when needed, and (5) inability to understand written directions for use of computers or software. The psychosocial category includes obstacles (3) lack of interest in computers, (4) lack of motivation/reward for learning to learn computers, and (7) computer anxiety. In the psychosocial category, an individual's held beliefs or values can hamper his or her ability to stay interested in the subject of study.

The Delphi survey method used in this study identified fifty-three different barriers to self-directed computer training at El Camino College. Similar obstacles were then combined to produce a list of twenty-two obstacles, which was then fed back to the respondent group for selection of the seven top-ranked

obstacles. The Delphi technique was used to add to the findings of other investigators in the fields of self-directed learning and computer training for college faculty.

Recommended Strategies

Three top-ranked strategies needed to overcome each of the seven major obstacles to self-directed computer training were identified by the Delphi survey group, resulting in the following twenty-one principal strategies:

(1) Allow the faculty to use computer labs on campus when students aren't using them.

(2) Make one PC available per faculty member on a permanent loan basis--given that the budget will allow it.

(3) Locate a dedicated PC in each classroom for CAI.

(4) Create a "buddy" system for interested faculty to share computer hardware/software experiences and knowledge.

(5) Hire a permanent computer assistant for each division.

(6) Publish a list of faculty members with various hardware or software experience who are willing to help other faculty learn new computer skills.

(7) Schedule staff development days with computers as topics.

(8) Establish a "buddy" system among interested faculty to help create interest among those who lack interest in computers.

(9) Create divisional/departmental computer users groups.

(10) Institute departmental awards for best CAI applications programs.

(11) Give time-credit or pay for experienced faculty to provide assistance on CAI projects.

(12) Include computer-literacy as part of the faculty evaluation process.

(13) Make available simple one-page introductory material.

(14) Provide video-tapes for learning computer skills.

(15) Hire full-time computer assistants for each division.

(16) Reduce the number of teaching hours required in class to permit work on time-consuming CAI programs.

(17) Limit the number of people authorized to place demands on a teacher's time.

(18) Reduce unnecessary paperwork.

(19) Increase the number of computer-literacy staff presentations during staff development days.

(20) Create divisional computer users groups to share experiences with colleagues.

(21) Institute a mentor or "buddy" system for computer training.

Some of the principal strategies developed by the Delphi technique survey group apply to more than one obstacle (an example of hitting two birds with one stone). These duplicate

strategies include creating a "buddy" system for computer learning, hiring a full-time computer assistant for each division, forming divisional computer users groups, increasing rewards for computer-literacy, and improving access to mico-computers for self-directed learning.

As was pointed out by Della-Dora and Blanchard (1979) the deans of instruction must take an active role in self-directed training of faculty. Involving the deans of instruction with the determination of the principal strategies needed to improve self-directed computer training made all of them think more deeply about removing existing barriers or obstacles to such training.

Conclusions and Recommendations

Interpretation of the results and literature review from this Major Applied Research Project led to the following conclusions and recommendations for the develpment of a program for self-directed computer training for college faculty:

(1) The first Delphi technique identified the following seven major obstacles, which impede self-directed computer training for faculty members at El Camino College:

a. Nonavailability of personal computers.

b. Lack of troubleshooting assistance when needed.

c. Lack of motivation/reward for learning to use computers.

d. Inability to understand written directions for use of computers or software.

e. Other obligations or demands on time.

f. Computer anxiety.

(2) The second Delphi technique strategy-survey placed the greatest importance upon the adoption of the following recommended strategies needed to overcome obstacles to self-directed computer training for faculty at El Camino College.

a. Allow faculty to use computer labs on campus when students aren't using them. Set up specific times for faculty use. Make PCs more readily available to take home. Locate PC in each classroom.

b. Create a "buddy" system and computer users groups for interested faculty to share computer hardware/software experiences and knowledge. Publish list of faculty with hardware/software skills.

c. Increase number of computer topics at staff development days.

d. Institute departmental awards for best CAI applications.

e. Make simple one-page introductory material available to faculty for software and hardware use (present computer instruction manuals are too hard to understand). Provide video-tapes for learning computer skills.

f. Reduce number of hours required in class to permit faculty development of CAI programs. Give extra pay for experienced faculty to provide assistance on CAI projects.

g. Hire a permanent division computer assistant for each division.

(3) Computer-Literacy Level Considerations and Recommendations

As a result of this study, it was found that a significant percentage of the faculty at El Camino College were not computer literate. Only twenty percent of the humanities faculty surveyed were computer-literate, while forty-eight percent of the math/science faculty surveyed were found to be computer-literate. These results indicate that significant differences exist between divisions in terms of the need for computer-literacy training. Based on these results, it is recommended that any computer training programs for faculty take divisional differences in computer-literacy into account.

(4) Self-Directed Computer Training Willingness Levels

From the results of this study, it was found that a majority (seventy percent) of computer-literate faculty learned their computer skills on their own. It was also determined that a

majority (fifty-six percent) of non-computer-literate faculty would prefer self-directed computer training over traditional classroom instructional methods. From these research results and the review of the literature, it was concluded that there was a need for self-directed computer training at El Camino College.

(5) Demographics of Computer-Literacy

Computer-literacy did not appear to be significantly affected by the demographic factor of age; however, gender differences did show up with men more computer-literate than women on the average. These differences were not statistically significant due to the small number of women faculty members in the math/science division compared with the humanities division.

(6) Ferris State University Model

Many models of self-directed computer training programs were found in the literature such as the Ferris State University Timme Center for Teaching Excellence (Sytsma et al., 1990). The Timme Center is a year-round campus-wide vehicle for promoting self-directed innovation in teaching and instruction. It goes far beyond computer-literacy. Faculty members are awarded stipends, a modest supply and equipment budget, and released time from teaching to produce computer-assisted (CAI) modules.

These modules may include interactive computer-controlled video. The faculty members who have CAI proposals selected are provided with a personal computer and video-disk controller, along with a choice of several university-supported authoring systems for use in creating CAI modules. The recipients of the Timme grants subsequently provide a core of expertise, and serve as enthusiastic supporters of utilizing new instructional technologies on a self-directed basis in their own disciplines. The Ferris State University Timme Center is one possible model for the implementation of a self-directed computer training program in the new information and computer technologies.

(7) Management and Governance

The deans of instruction should be self-directed in implementing the recommendations of this Major Applied Research Project--and should tailor the recommendations to their own local divisional or departmental budgetary needs and constraints. As time goes on, the need for computer-literacy training of faculty of the traditional or self-directed varities will diminish as computer education is "pushed down" to the high school, junior-high, and ultimately the grade school level.

Implications for the Improvement of Educational Practice

This study provides for the improvement of educational practice in several areas: (1) the identification of computer literacy levels for faculty members at El Camino College, (2) identification of high-priority obstacles to self-directed computer training at El Camino College along with recommended strategies needed to overcome these obstacles, and (3) recommended strategies for the development of a program in self-directed computer training for faculty members.

In addition, a modified version of the computer usage survey instrument (Appendix B) used in this study can be employed by the deans of instruction of El Camino College as an assessment tool for newly-hired faculty, in order to assess their computer-literacy. This will aid in identifying new faculty in need of computer-literacy training and the variety of training required.

The overall implication is that a long-standing problem in the computer-literacy training of faculty at El Camino College can be solved. It is expected that many of the results and conclusions obtained in this study will be applicable to other community colleges across the nation.

Strategies for Diffusion and Implementation

The diffusion and implementation process will take place on the local, state, and national levels. It will consist of the following three steps:

Step One

At El Camino Community College, the diffusion process will consist of presenting final copies of the approved research project study results to (1) the President and Vice-President of Instruction; (2) the departmental deans of instruction; (3) staff development officers; and (4) the College Academic Senate. Interested individuals will also receive a briefing based on the findings of this study with a special emphasis on the strategies needed to overcome high-priority barriers to self-directed computer training. Recommendations for the implementation and evaluation of such a program at El Camino College will be presented during this briefing.

Step Two

At the state level, the final study results will be presented to the California Postsecondary Education Commission (CPEC) research unit. CPEC research personnel will be contacted in order to determine their interest in the possibility of

implementing the recommendations of the approved Major Applied Research Project on a statewide level.

Step Three

At the national level, a copy of the approved Major Applied Research Project will be forwarded to the Educational Resources Information Center (ERIC), of the National Institute of Education, for possible inclusion in the ERIC system and publication. Dr. John Losak of Nova University has expressed an interest in the results of this study, and he will be sent a copy of this Major Applied Research Project after it has been approved. A copy of the approved report will be submitted to Nova's Center for the Advancement of Education for publication in their annual compilation of Educational Improvement Projects.

Finally, the approved manuscript will be submitted for publication to such journals as (1) Adult Education Quarterly, (2) Educational Technology, (3) Technological Horizons in Education Journal, and (3) Teacher's Education and Special Education Journal.

BIBLIOGRAPHY

BIBLIOGRAPHY

Austin, Henry S. "Results of Faculty Computing Survey." paper presented at the League for Innovation in the Community Colleges Conference, Toronto, Canada, ERIC ED 301 270, February, 1988.

Anandam, K. "Camelot is Here and Now." Technological Innovations in Educational Settings, 10:1-2, 1984.

Best, John W. Research in Education. 3rd. ed. Englewood Cliffs: Prentice-Hall, Inc., 1977.

Bracey, Gerald W. "What the Research Shows." Electronic Learning. 7:51-54, November, 1982.

Brockett, Ralph. "Self-Directed Learning and the Adult." Lifelong Learning, 6(8):16-18, April, 1983.

Brockett, Ralph. "The Relationship Between Self-Directed Learning Readiness and Life Satisfaction Among Older Adults." Adult Education Quarterly. 35(4):210-219, 1985.

Brockett, Ralph. "A Response to Brookfield's Critical Paradigm of Self-Directed Adult Learning." Adult Education Quarterly, 36(1):155-59, 1985.

Brookfield, Stephen. "Independent Adult Learning." Studies in Adult Education, 13(1):15-27, 1981.

Brookfield, Stephen. "Self-Directed Adult Learning: A Critical Paradigm." Adult Education Quarterly, 35(2):59-71, Winter, 1984.

Brookfield, Stephen. Understanding and Facilitating Adult Learning, San Francisco: Jossey-Bass Publishers, 1986

Brown, Eric. "Hypertext Wins Respect." PC World. 6:74-76, August, 1988.

Bracey, Gerald W. "What the Research Shows." Electronic Learning. 7:51-54 November and December, 1983.

Cale, E. G. et al. "Price/Performance Patterns of U.S. Computer Systems." Communications of the Association for Computing Machinery. 22(4):225-230, 1979.

Carlson, Elizabeth A. and Carl F. Berger. "Increasing Teacher Access to Ongoing Computer Training." Technological Horizons in Education. 15:64-68, May, 1988.

Cheren, M. "Helping Learners Achieve Greater Self-Direction." R. M. Smith (ed.), New Directions for Continuing Education. San Francisco: Jossey-Bass, 19:23-38, 1984.

Cloutier, Lucinda R. "Faculty and Staff Computer Literacy Needs Assessment: A Report on Survey Results." ERIC ED 279 613, November, 1985.

Cole, Anthony Z. and Robert Riser. "East Tennessee State's Initiative in Computer-Literacy for Faculty Members." Technological Horizons in Education Journal. 14:60-63, June, 1987.

Dalkey, Norman C. DELPHI. Los Angeles: Rand Corporation Report, 1967.

Darkenwald, G. Participation in Education by Adults. Series In New Directions for Continuing Education, Vol. 21:15-29, San Francisco: Jossey-Bass Inc., 1984.

Delbecq, Andre L., Andrew H. Van de Ven. Group Techniques for Program Planning. Illinois: Scott, Foresman and Co., 1975.

Della-Dora, Delmo and Lois J. Blanchard, eds. Moving Toward Self-Directed Learning. Virginia: ASCO, 1979.

Dellow, Donald. "A Community College Response to a Campus-Wide Need for Computer Literacy." paper presented at the Florida Instructional Computing Conference, Orlando, Florida, ERIC ED 253 288, January, 1985.

Dennis, Richard J. "Instructional Applications of Computers." Computers in the Classroom. 1:11-25, Washington, D.C. National Education Association Publication, 1983.

Dertouzos, Michael L., and Joel Moses, eds. The Computer Age: A Twenty-Year Review. Cambridge: MIT Press, 1979.

Dillon, Ronna F. and Ronald R. Schmeck. Individual Differences in Cognition. New York: Academic Press, 1983.

Durbak, Ivan R. and Nicholas O. Sadnytzky. "The Hidden Crisis in Education." Community College Review. 12:7-13, 1984.

Duttweiler, P.C. "Barriers to Optimum Use of Educational Technology." Educational Technology. 11:37-39, November 1983.

Dunn, Jovanne V. "The Computer as a Teaching Tool" Pennsylvania State Department of Education Report, ERIC ED 273 311, January, 1985.

Ewing, Jeanne B., Mary E. Ewing, Jack London, and Yolanda Ramirez-Ponce. "Adult Education and Computer Literacy: A New Challenge." Lifelong Learning: An Omnibus of Practice and Research, 10(3), 1986.

Futrell, Mary H. "Teachers Lack Computer-Literacy." Las Vegas Review Journal, Vol. 85:150, August, 1989.

Galloway, Patricia. "Computers for Professors: A Guide for the Perplexed." Academe. 70:9-16, 1984.

Gibbons, Maurice, Alan Bailey, Paul Comeau, Joe Schmuck, Sally Seymour, and David Wallace "Towards a Theory of Self-Directed Learning Without Formal Training." Journal of Humanistic Psychology, 20(2):41-56, Spring, 1980.

Goodman, Danny. The Complete HyperCard Handbook. New York, N.Y.: Bantam Books, 1988.

Grady, M. Tim and James Poirot. "Teacher Competence: What is Needed." Computers in Curriculum and Instruction. Association for Supervision and Curriculum, 1:78-81, 1983

Helms, Susan. "Faculty Microcomputer Usage: Results of a Training Workshop and Follow-Up Study." Journal of Education for Business, 4:149-152, January 1987.

Houle, C. O. Continuing Learning in the Professions. San Francisco: Jossey-Bass Publishers, 1976.

Irvine, Phyllis. "Introducing Faculty to Microcomputers." Health Education. 14:13-14, October, 1983.

Isaac, Stephen and William B. Michael. Handbook in Research and Evaluation. San Diego, Calif.: Edits Publishers, 1987.

Issa, Raja. "Variations in Anxiety and Attitudes of Black High School Teachers Towards Computers." ERIC ED 309 209, February, 1989.

Jalbert, Norie L. "Computer Literacy and the Forgotten Professor." paper presented at the annual meeting of the American Educational Research Association, San Francisco, California, ERIC 270 036, April, 1986.

Johnston, Jerome. "Information Literacy: Academic Skills for a New Age." University of Minnesota, ERIC ED 270 042, September, 1985.

Joiner, Lee M., Sidney R. Miller, and Burton J. Silverstein. "Potentials and Limits of Computers in Schools." Microcomputers in the Schools. Phoenix, Arizona: Oryx Press, 1:12-16, 1983.

Killian, Joyce. "Fostering Computer Competence in the School Environment." paper presented at the Annual Meeting of the National Council of States on In-Service Education. Orlando, Florida, ERIC ED 258 326, November, 1984.

Kintzer, Frederick C. "Advantages of Open-Response Questions in Survey Research." Community/Junior College Research Quarterly. 3:37-46, 1977.

Klassen, D. L. and R. E. Anderson. "Computer Literacy." Computers in the Classroom. 1:26-41, Washington, D.C.: National Education Association Publication, 1983.

Knowles, Malcolm. Self-Directed Learning: A Guide for Learners and Teachers. Illinois: Associated Press, 1975.

Knowles, Malcolm. "Contract Learning." Materials and Methods of Continuing Education. Klevins Publications, 1:181-188, 1978.

Knowles, Malcolm. Andragogy in Action. Jossey-Bass Publishers, California, 1984.

Knox, Alan B. "Reducing Barriers to Participation in Continuing Education." Lifelong Learning, 10(5):7-9, 1987.

Kulik, Chen-Lin and James A. Kulik. "Effectiveness of Computer-Based Education in Colleges." AEDS Journal. 20:81-109, Winter/Spring, 1986.

Kulik, James A. and Chen-Lin Kulik. Review of Recent Research Literature on Computer-Based Instruction." Contemporary Educational Psychology. 12:222-230, 1987.

Levin, Daniel. "Teach Teachers Computer." Executive Educator. 5:19-20, March, 1983.

Lewis, D. R.; Dalgaard, B. R. and C.M. Boyer. "Is CAI Economical in Economics?" paper given at AERA meeting, April, 1984.

Long, Thomas J., John J. Conwey, and Adele R. Chwalek. Completing Dissertations in the Behavioral Sciences and Education. San Francisco, California: Jossey-Bass Publishers, 1986.

Leuhraman, Arthur. Computer-Literacy: A Hands-On Approach. New York, N.Y.: McGraw-Hill Publishing Company, 1983.

Lengrand, P. Areas of Learning Basic to Lifelong Education. New York: Pergamon Press, 1986.

Lindbeck, Joy S. "Implementing Courses in Microcomputer Applications in the Secondary Schools for the Undergraduate and Graduate Level." paper presented at the conference on Teacher Education in the Computer Age, Athens, Ohio, ERIC ED 226 002, November, 1982.

McCord, Joan. "A Faculty-Computer Nexus." Microcomputing Working Paper Series, Drexel University, ERIC ED 254 116, November, 1984.

Merbler, John B. and Dale L. Lawyer. "A Pre-Service and In-Service Computer-Literacy Training Program for Teachers." Teacher Education and Special Education, 3:196-202, ERIC EJ 313813, Summer, 1983.

Mezirow, Jack. "Concept and Action in Adult Education." Adult Education Quarterly, 35(3):142-151, Spring, 1985.

Molnar, Andrew R. Computer Education. Monterey, California: Books/Cole Publishing Company, 1983.

Moravec, Hans. Mind Children. Cambridge, Massachusetts: Harvard University Press, 1988.

Naisbitt, John. Megatrends. New York, N.Y.: Warner Books Inc., 1984.

Pantiel, Mindy and Becky Peterson. "Are Your Teachers Ready for Computers?" Principal, 4:44-46, March, 1985.

Peinovich, Paula E. "Hidden Barriers: A Sociological Investigation of Adult Participation in Continuing Education." ERIC ED 271 549, April, 1986.

Petrosky, Mary. "How to Make the Electronic Mail Connection." Infoworld. 37:27-29, November, 1985.

Pomeroy, James L. "Determining the Computer-Literacy Levels and Developing a Computer In-Service Program for Vocational Teachers in Southern Nevada." Nova University Major Applied Research Project. July, 1990.

Queisser, Hans. The Conquest of the Microchip. Cambridge: Harvard University Press, 1988.

Rosen, Saul. "ACM 71: A Quarter Century View." Association for Computing Machinery Journal. New York, 1971.

Schwartz, Eileen. "Microcomputer Training for Faculty: A Humane Approach." paper presented at the meeting of the UCLA Conference on Computers and Writing: New Directions in Teaching and Research. Los Angeles, ERIC ED 264 577, May, 1985.

Skruber, Richard. Designing Learning Environments for the Enhancement of Self-Directed Learning: A Personal Approach to Intergrating Theory and Practice. ERIC ED 239 028, 1982.

Smith, Robert M., and Gregory S. Bowes. "Self-Directed Staff Development for Teachers: A Case Study." Adult Literacy and Basic Education. 10(2):80-88. 1986.

Spero, Samuel. "Let Them Have Micros: An Approach to Computer Literacy for Teachers." Technological Horizons in Education Journal. 10:127-129, September, 1982.

Stecher, Brian M. and Ronald Solorzano. "Characteristics of Effective Computer In-Service Programs." Research Report. Educational Testing Serice, ERIC ED 291 357, July, 1987.

Sytsma, Sidney; S. Octernaud and D. Hobart "Implementing New Instructional Technology Through Faculty Development." Nova University 1990 Summer Institute. Fort Lauderdale, Florida, July, 1990.

Toffler, Alvin. The Third Wave. New York: William Morrow and Company Publishers, 1981.

Townsend, Barbara and Deborah Hale. "Coping Strategies for Resistance to Microcomputers." Technological Horizons in Education Journal. 36-38, November 1981.

Turner, Judith A. "Consulting Scholars: Helping Colleges Explore the Role of Computers in Academic Life." Chronicle of Higher Education, 25:11-12, March, 1988.

Turner, Judith A. "With the Aid of Computer: New Publishing Ventures Allow Professors to Create Customized Textbooks." Educational Technology. 3227-29, November, 1989.

Verduin, John R., Harry G. Miller, and Charles E. Greer. The Lifelong Learning Experience. Illinois: Charles C. Thomas Publishing, 1986.

Waldorp, Phillip B. and Thomas M. Adams. "Overcoming Resistance to the Use of Instructional Computing in Higher Education." ERIC ED 296 656, May, 1988.

Walla, Kay and Robert Wendel. "A Model for Computer-Literacy Staff Development in Teacher Education." ERIC ED 238 863, 1983.

Watt, Daniel H. "Computer-Literacy: What Should Schools Be Doing About It?" Microcomputers in the Schools. 1:104-107, Phoenix, Arizona: Oryx Press, 1983.

Wedman, John and Marlene I. Strathe. "Computer Literacy for Teacher Educators: A Prerequisite for the 21st Century." paper presented at the annual meeting of the American Association of Colleges for Teacher Education. San Antonio, Texas, ERIC ED 241 508, February, 1984.

Weinstein, Claire E. "Fostering Learning Autonomy Through the Use of Learning Strategies." Journal of Reading, 30(7):590-595, April, 1987.

Wheelwright, Stevin C., and Spyros Makridakis. Forecasting Methods for Management. New York: John Wiley and Sons, 1973.

Winans, Glen T. "Implementing Microcomputers in Academic Departments: Changing the Face of Academic and Administrative Life at the University of Califiornia, Santa Barbara." paper presented at the CAUSE National Conference, New Orleans, Louisiana, ERIC ED 265 767, December, 1985.

Wood, Merle. Computer Awareness. Cincinnati, Ohio: South-Western Publishing Company, 1982.

Young, Marsha. "Faculty Computer Workshops:,A Faculty Becoming Computer Literate." American Annals of the Deaf. 130:347-353, November, 1985.

Zemke, R. "Self-Directed Learning: A Must Skill in the Information Age." Training/Human Resources Development, 19:28-30, August, 1982.

APPENDIX A

Obstacle Questionnaire: Delphi

Self-Directed Computer-Training Survey Group

Obstacles to Self-Directed Computer Training

Dear:

Thank you in advance for participating in our analysis of obstacles to self-directed computer training. Your insights will be most helpful in designing self-directed computer training programs for El Camino Community College that will involve faculty members learning computer skills on their own, at times of their own choosing, and with minimal assistance from instructional staff.

Specifically, we need your help in identifying obstacles or barriers that might adversely affect such self-directed computer training programs. The results will be used to develop strategies needed to overcome these obstacles, and hopefully lead to effective self-directed computer training programs.

I am attaching the first of two questionnaires designed to seek your assistance in this project. Please take a few minutes to complete the attached questionnaire and mail it to Don Mc Allister, Department of Mathematics and Physical Sciences, El Camino College as soon as possible. Again, thank you for your help in this project.

Sincerely yours,

Don McAllister

Don Mc Allister
Physics Department
El Camino College

Obstacle Questionnaire Number 1

Mail to Don Mc Allister, Physics Department, El Camino College

What Obstacles Are Present That Prevent Self-Directed Computer Training?

Please be clear and concise. Thank you!

Obstacles:

e.g. Nonavailability of personal computers.
Lack of troubleshooting assistance when needed.

APPENDIX B

Strategy Questionnare: Delphi

Self-Directed Computer-Training Survey Group

Strategy Questionnare: Delphi

Dear:

Thank you in advance for participating in our analysis of obstacles to self-directed computer training. Your insights will be most helpful in designing self-directed computer training programs for El Camino Community College that will involve faculty members learning computer skills on their own, at times of their own choosing, and with minimal assistance from instructional staff.

Specifically, we need your help in identifying obstacles or barriers that might adversely affect such self-directed computer training programs. The results will be used to develop strategies needed to overcome these obstacles, and hopefully lead to effective self-directed computer training programs.

I am attaching the first of two questionnaires designed to seek your assistance in this project. Please take a few minutes to complete the attached questionnaire and mail it to Don Mc Allister, Department of Mathematics and Physical Sciences, El Camino College as soon as possible. Again, thank you for your help in this project.

Sincerely yours,

Don McAllister

Don Mc Allister
Physics Department
El Camino College

Self-Directed Computer-Training Survey Group

Strategy Questionnaire Number 1

When Completed Mail to Don Mc Allister, Physics Department, E.C.C.

Please List Strategies Needed to Overcome Each Obstacle to Self-Directed Computer Training!

Please be clear and concise. Thank you!

Top Ranked Obstacles: (please list strategies after each obstacle)

1) Nonavailability of personal computers.

2) Lack of troubleshooting assistance when needed.

3) Lack of interest in computers.

4) Lack of motivation/reward for learning to use computers.

5) Unable to understand written directions for use of computers/software.

6) Other obligations or demands on time.

7) Computer anxiety.

APPENDIX C

Computer Survey Questionnaire

Computer Usage Survey Questionnaire

GENERAL INFORMATION:
Subjects Taught _____

When completed Mail to Don Mc Allister, Physics Department, El Camino

Male ☐	**AGE:** 21-25 ☐ 26-30 ☐ 31-35 ☐ 36-40 ☐
Female ☐	41-45 ☐ 46-50 ☐ 51-55 ☐ 56-above ☐

Check The Box That Applies to You

☐ I would rather learn to use a computer on my own.

☐ I would rather learn to use a computer in a formal class.

SKILLS AREA:
Directions: If you have a working knowledge of the skills listed below, check the "Yes" box. The assumption is that you use or could use the specific skill at least once a week. Otherwise, check the "No" box.

1. On, Off, Open, Close, and Save? YES ☐ NO ☐
Can you turn the computer on and off, load a disk into the machine, open a file in any program or computer language, close a file and save data onto a disk?

2. Word Processing? YES ☐ NO ☐
Can you operate a word processing program and print your document on a computer printer?

3. Data-base, Spreadsheet, or Gradebook Program? YES ☐ NO ☐
Can you operate or use on a regular basis any one or more of the above listed types of computer applications programs?

4. Programming? YES ☐ NO ☐
Can you write a simple computer program using a relatively common computer language like BASIC, Logo, or Pilot?

List other Computer Skills: (Include industry or trade applications.)

_____

_____

_____

5. Did you learn your computer skills before beginning to teach or after?
N/A or None ☐ Before ☐ After ☐

6. Where did you first learn your computer skills?
2-Year College ☐ 4-Year College ☐ Industry Schools ☐ On-the-Job ☐ Self-Taught ☐

APPENDIX D

El Camino College Staff Development Programs in Computer Technology

EL CAMINO COLLEGE
STAFF DEVELOPMENT OFFICE

Inter-Office Memorandum

TO: ALL FACULTY

FROM: Denise Morgan, Jess Carreon,
Carol Carlos, Donna Manno, Bernie Rang

SUBJECT: STAFF DEVELOPMENT DAYS/FLEX CALENDAR

Attached is the tentative program for the Staff Development Days/Flex Calendar scheduled on September 6 and 7, 1990.

In order to follow through with planning, eliminate topics no one is interested in, and schedule rooms, we are asking you to choose the workshops you wish to attend. On the form on the following page, please indicate your ***first and second choice*** by filling in the program number (the three-digit number on the attached schedule which appears to the left of the workshop title). We realize this is an extremely busy time of the year and appreciate your efforts in conforming with our request.

Full-time faculty are required to accumulate a minimum of 5.5 credit hours on Thursday by attending the keynote and selected workshops. On Friday a minimum of 6 credit hours are required by attending the keynote, selected workshop, and division department meeting(s).

Part-time faculty are required to accumulate 3 credit hours. Although Thursday evening is primarily designed for this purpose, you are encouraged and welcome to attend any of the program events.

THANK YOU FOR YOUR COOPERATION, ENJOY THE SUMMER AND WE LOOK FORWARD TO SEEING YOU ON SEPTEMBER 6 AND 7, 1990.

PLEASE RETURN THIS COMPLETED SHEET TO THE STAFF DEVELOPMENT OFFICE BY THURSDAY, JUNE 20, 1990.

SAMPLE

10:15-11:45 (1.5 credit hours) CONCURRENT SESSIONS - A

First choice 103 Second choice 102

THURSDAY - SEPTEMBER 6, 1990

8:45-9:50 (1 credit hour) KEYNOTE ADDRESS

10:15-11:45 (1.5 credit hours) CONCURRENT SESSIONS - A

First choice _____ Second choice _____

1:00-2:30 (1.5 credit hours) CONCURRENT SESSIONS - B

First choice _____ Second choice _____

1:00-4:00 (3 credit hours) CONCURRENT SESSIONS - C

First choice _____ Second choice _____

2:45-4:15 (1.5 credit hours) CONCURRENT SESSIONS - D

First choice _____ Second choice _____

THURSDAY EVENING - SEPTEMBER 6, 1990

4:00-5:30 (1.5 credit hours) CONCURRENT SESSIONS - E

First choice _____ Second choice _____

6:30-8:30 (2 credit hours) CONCURRENT SESSIONS - F

FRIDAY - SEPTEMBER 7, 1990

8:45-9:30 (1 credit hour) KEYNOTE ADDRESS

9:45-11:45 (2 credit hours) CONCURRENT SESSIONS - G

First choice _____ Second choice _____

1:00-4:00 DIVISION/DEPARTMENT MEETINGS (3 credit hours)

NAME: _____ DIVISION: _____

(Please print)

EL CAMINO COLLEGE
STAFF DEVELOPMENT DAYS/FLEX CALENDAR

THURSDAY - SEPTEMBER 6, 1990

8:00 - 10:00 ALL EMPLOYEES MARSEE AUDITORIUM

8:00-8:45 *Registration Coffee and Donuts*
8:45-9:00 *Welcome*

9:00-9:50 *Keynote Address Dr. Carlos Cortes*
"The Implications of Ethnic Diversity for Community Colleges in the Future"

9:50 - 10:15 ENERGY BREAK MARSEE AUDITORIUM

10:15 - 11:45 CONCURRENT SESSIONS - A (1.5 credit hours)

101 DEALING WITH DIVERSITY ON A DAY-TO-DAY BASIS
CARLOS CORTES
How classified staff make a difference in dealing with the multi-ethnic students and co-workers in the Community College environment.

102 STRESS MANAGEMENT
Practical techniques for managing stress.

103 EVOLVING TECHNOLOGIES AS TEACHING AND LEARNING TOOLS
Interactive multimedia tools (videodisc, CD-ROMS, computers) will have a major impact on classrooms and information resource centers over the next decade. Live demonstrations will show the potential of these evolving technologies in the learning process.

104 MOTIVATING UNDERPREPARED STUDENTS
URI TRIESMAN
A focus on teaching strategies to meet the needs of different student populations. How to maintain quality instruction.

105 SELF-ESTEEM AND EMPOWERMENT
How the acquisition of self-esteem in ourselves is transferred to students and peers and enhances the classroom and work environment.

11:45 - 1:00 LUNCH/BBQ - ALL EMPLOYEES - CAFETERIA

1:00 - 2:30 CONCURRENT SESSIONS - B (1.5 credit hours)

108 STRESS MANAGEMENT

Practical techniques for managing stress.

109 ZIG-ZAGGING THROUGH HIGHER EDUCATION - STUDENT PROFILES
MARLENE GRIFFITH

The conventional view of how students go through higher education is largely false. How can community colleges serve all Californians in the 1990's?

110 CLASSROOM-BASED RESEARCH
SUSAN OBLER

An overview of the major components of classroom-based research and it's applicability to the present educational environment.

111 TEACHING AND LEARNING STRATEGIES FOR UNDERREPRESENTED STUDENTS
URI TRIESMAN

An opportunity for math and science faculty to discuss the details of UC Berkeley's approach to innovative teaching and learning strategies.

112 THE YEAR 2000: THE ROAD AHEAD
LEO COLEMAN

A look at the workforce of the 1990's and the fourteen trends that are influencing the American work environment - WHATEVER HAPPENED TO THE GOOD OLD DAYS? Workplace basics --the skills employers want and the skills employees need.

113 EVOLVING TECHNOLOGIES AS TEACHING AND LEARNING TOOLS

Interactive multimedia tools (videodisc, CD-ROMS, computers) will have a major impact on classrooms and information resource centers over the next decade. Live demonstrations will show the potential of these evolving technologies in the learning process.

114 LEGAL ISSUES IN HIGHER EDUCATION: IMPACT ON THE COMMUNITY COLLEGE
JESS CARREON

A brief overview with discussion on issues that impact the community college environment on a short and long term basis.

1:00 - 4:00 - CONCURRENT SESSIONS - C COMPUTERS (3 credit hours)

115 LOTUS 1-2-3 - AN INTRODUCTION

116 D BASE III - AN INTRODUCTION

117 WORDPERFECT - AN INTRODUCTION

118 GRADING AND STUDENT RECORD KEEPING

A panel presentation and demonstration of a variety of grading a record keeping functions for faculty.

119 MACINTOSH - AN INTRODUCTION

120 HARVARD GRAPHICS + DATA DISPLAY = GREAT PRESENTATIONS
TOM STORER

*A hands-on workshop for constructing "slide" presentations for the classroom. Learn how to use **HARVARD GRAPHICS** to create titles, text charts, bar, line, organization charts. You can integrate computer generated slide presentation with **DATA DISPLAY** an interface device which allows computer screen images to be projected onto a movie screen.*

1:00 - 4:00 CONCURRENT SESSIONS - C GENERAL (3 credit hours)

122 TEMPERAMENT/LEARNING STYLES

Specific training for instructors involving the identification of individual temperament/teaching style and the impact on student learning style: implications on teaching methodology.

123 TEMPERAMENT/WORKING STYLES

Specific training for employees involving the identification of individual temperament/work style and the impact on work environment.

124 CAREER ASSESSMENT

What do I want to do when I grow up? A presentation of career assessment options to help employees identify their strengths and career interests.

125 THE USE OF THE "MOSTLY REGAL" FACIAL MACHINE

Training for cosmetology instructors on a new piece of equipment.

2:30 - 2:45 ENERGY BREAK

2:45 - 4:15 CONCURRENT SESSIONS - D (1.5 credit hours)

130 WHAT'S SO "HIGH TECH" ABOUT THE HIGH TECH CENTER?
RAY LOVELL

Alternate Input/Output computer devices will be demonstrated i.e. keyboard emulator, large print to the screen, voice and braille output. A spell checker and grammar checker also will be demonstrated.

131 FOUR STAGES OF THE TERM PAPER
LINDA WADLEIGH

A teaching/learning video with step-by-step procedures on how to write a research paper.

132 PLANETARIUM SHOW
JIM LUND

Update on the Hubble Telescope and what's new in the skies.

133 UNDER PRESSURE STOP GAP THEATRE GROUP

An entertainment presentation focusing on lack of self-esteem, family disfunction, peer pressure and their relationship to the abuse of alcohol and drugs.

134 VOICE MAIL

A training session for those who have voice mail but are not using it.

135 LEARNING DISABILITIES AND STUDENT SUCCESS

Strategies to help faculty identify students with learning disabilities: an approach to understanding learning differences.

136 "A" STUDENTS / "C" STUDENTS: BRIDGING THE GAP

Challenges faculty face in educating and motivating students of the 90's.

137 THE "HOW TO's" OF GRANT WRITING
ROD FLEEMAN

Everything you ever wanted to know about the nuts and bolts of submitting a grant proposal.

138 IMPACT OF TITLE V ON INSTRUCTION
JESS CARREON

A discussion of the Title V issues and their impact on classroom presentation involving critical thinking and writing across the curriculum.

139 USING MULTI-CULTURAL LITERATURE: HOW DO I TEACH WHAT I DON'T KNOW?
SARA BLAKE AND JANET MADDEN-SIMPSON

A brief overview of cross-cultural criticism and non-traditional texts, with emphasis on use of multi-cultural literature in the classroom.

140 TELEPHONE TECHNIQUES

An overview of telephone manners and the important steps in telephone usage. Practical tips for clearer communication, faster service, fewer delays, less confusion and errors.

141 SPRING, SUMMER, FALL, WINTER: IDENTIFYING YOUR PERSONAL COLORS AND HOW TO DRESS FOR SUCCESS

How you look and feel about yourself can impact job satisfaction.

142 ORIENTATION TO ESL DEPARTMENT

A general discussion of the ESL program for part-time instructors.

143 ADULT LEARNING THEORY

The importance of understanding adult learning theory and how it impacts your teaching style.

144 MANAGING DIFFICULT PEOPLE AND SITUATIONS
LEO COLEMAN

Conflict resolution strategies in dealing with difficult and irate people.

145 LEARNING STRATEGIES
SHAREN KOKASKA

Three practical learning strategies to use in classroom instruction to facilitate student involvement and retention of material.

THURSDAY EVENING - ADJUNCT FACULTY

4:00 - 5:30 REGISTRATION - CAFETERIA

4:00 - 5:30 CONCURRENT SESSIONS - E (1.5 credit hours)

151 COMPUTER ASSISTED INSTRUCTION AT ECC SUE DEVER

A presentation of instructional software available to enhance student learning.

152 FOUR STAGES OF THE TERM PAPER
LINDA WADLEIGH

A teaching/learning video with step-by-step procedures on how to write a research paper.

153 LIBRARY RESOURCES

Using the Library's Online Catalog, Periodical research on Wilsonline CD-Rom stations, DIALOG online search services, and Unique Reference resources.

154 LEARNING DISABILITIES AND STUDENT SUCCESS

Strategies to help faculty identify students with learning disabilities: an approach to understanding learning differences.

155 "A" STUDENTS / "C" STUDENTS: BRIDGING THE GAP

Challenges faculty face in educating and motivating students of the 90's.

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A discussion of the Title V issues and their impact on classroom presentation involving critical thinking and writing across the curriculum.

157 USING MULTI-CULTURAL LITERATURE: HOW DO I TEACH WHAT I DON'T KNOW
SARA BLAKE AND JANET MADDEN-SIMPSON

A brief overview of cross-cultural criticism and non-traditional texts, with emphasis on use of multi-cultural literature in the classroom.

158 ART DEPARTMENT WORKSHOP

Review of course content and objectives, instructional strategies, program continuity and implementing the new gallery attendance lab for Art 1 and 4.

159 ESL ROUND ROBIN

A skills workshop on ESL course topics --speaking/listening, reading, and writing.

160 APPLIED MUSIC DEPARTMENT WORKSHOP

Discussion and development of goals and objectives and student requirements.

4:30 - 5:50 CAMPUS TOUR/SERVICES

5:30 - 6:30 DINNER/BBQ - ADJUNCT FACULTY - CAFETERIA

6:15 - 7:00 CAMPUS TOUR - NEW ADJUNCT FACULTY

7:00-8:00 NEW ADJUNCT FACULTY ORIENTATION - MUSIC 7 (RECITAL HALL)

8:00-9:00 DIVISION/MENTOR MEETING

6:30-8:30 CONCURRENT SESSIONS - F (2 credit hours)

171 COLLABORATIVE LEARNING
SALLIE BROWN
Strategies for effectively using Collaborative Learning in the classroom and the impact on student success.

172 CLASSROOM-BASED RESEARCH
SUSAN OBLER
An overview of the major components of classroom-based research and it's applicability to the present educational environment.

173 ART DEPARTMENT WORKSHOP (Continued)
Review of course content and objectives, instructional strategies, program continuity and implementing the new gallery attendance lab for Art 1 and 4.

174 TEMPERAMENT/LEARNING STYLES
Specific training for instructors involving the identification of individual temperament/teaching style and the impact on student learning style: implications on teaching methodology.

175 STUDENT SUPPORT SERVICES
An overview of the student support services offered at ECC: a resource for part-time faculty.

176 ZIG-ZAGGING THROUGH HIGHER EDUCATION - STUDENT PROFILES
MARLENE GRIFFITH
The conventional view of how students go through higher education is largely false. How can community colleges serve all Californians in the 1990's?

177 LEARNING STRATEGIES
SHAREN KOKASKA
Practical learning strategies to use in classroom instruction to facilitate student involvement and retention of material.

FRIDAY, SEPTEMBER 7, 1990

8:45-9:30 ALL EMPLOYEES MARSEE AUDITORIUM
Coffee and donuts

8:45-9:30 *KEYNOTE* *Arthur Lange "What Makes for Exceptional People: The Ten Critical Qualities and How to Acquire Them*

9:30-9:45 ENERGY BREAK

9:45-11:45 CONCURRENT SESSIONS - G COMPUTERS (2 credit hours)

201 LOTUS 1-2-3 - AN INTRODUCTION

202 D BASE III - AN INTRODUCTION

203 CREATE A TEST
A hands-on worshop on how to use the computer test banks supplied by textbook publishers.

204 MACINTOSH - GRAPHICS

9:45-11:45 CONCURRENT SESSIONS - G GENERAL (2 credit hours)

210 EARTHQUAKE PREPAREDNESS
How to shake, rattle and roll and live through it: instructions for home and work preparation and safety.

211 WELLNESS AT EL CAMINO COLLEGE
*An overview of the variety of programs available to faculty and staff in the newly developed **WELLNESS CENTER** and a tour of the facilities.*

212 FUND FOR INSTRUCTIONAL IMPROVEMENT GRANTS
LABARON WOODYARD
A presentation from the Chancellor's Office on how to successfully apply for and write FII grant proposals. FII request for proposals will be sent out in October and due in March 1991.

213 KNOW YOUR FACULTY CONTRACT
A review of AFT contract changes for faculty and management.

214 KNOW YOUR CLASSIFIED EMPLOYEE CONTRACT

A review of the CSEA contract changes for classified employees and management.

215 AGAINST HER WILL

ED GROPP

A film and discussion that examines "Date Rape."

216 Academic Senate Goals and Objectives

An opportunity for Academic Senate Council members to discuss and determine priorities for 1990-91.

217 EXCEPTIONAL MANAGEMENT AND SUPERVISION OF PEOPLE

ARTHUR LANGE

This workshop is designed for managers and supervisors.

218 HOW TO STRETCH YOUR PAYROLL DOLLARS

Instructions on how to use the Internal Revenue Code - section 125 to offset health benefits deductions, save tax dollars, and maximize spending power.

219 PLANETARIUM SHOW

JIM LUND

Update on the Hubble Telescope and what's new in the skies.

220 LIMITING PERSONAL LIABILITY IN THE CLASSROOM AND ON THE JOB

A legal presentation of classroom and work related situations to protect the employees from sexual harassment allegations -- its a bigger problem than you think.

221 MEMORY IMPROVEMENT

SALLIE BROWN

Practical exercises and techniques for improving your memory.

222 ENVIRONMENTAL PROBLEMS

A panel discussion of some of the environmental issues and problems facing us today and how we can each do our small part to work towards a better, safer planet.

11:45-1:00 LUNCH ALL EMPLOYEES CAFETERIA

1:00-4:00 DIVISION/DEPARTMENT MEETINGS (3 credit hours)

Divisions will have the opportunity to design their own agendas in preparation for the Fall Semester.

APPENDIX E

Ferris University Faculty Development Programs in Computer Technology

Nova University
1990 Summer Institute

Leadership for Innovation and Change

Implementing New Instructional Technology Through Faculty Development

1. Brief description of Ferris State University
   a. Size
   b. Career Orientation
   c. Sparcely funded
   d. Technology driven
   e. Predisposition toward the IBM PC and compatible microcomputers

2. Desire to encourage faculty to strive for excellence in teaching

   Research findings...
   change is best encouraged by using funds to stimulate innovation instead of rewarding it after the fact (merit)

3. Creation of the Timme Center for Teaching Excellence

   Funding Priorities:
   a. **Faculty Travel Grants**
      Purpose: to assist faculty in professional travel when sufficient funds are unavailable within departmental and school budgets

   b. **Instructional Assistance Grants**
      Purpose: to assist faculty in funding innovative instructional projects in which the emphasis is on delivery, not content

   c. **Advanced Instructional Technology Grants**
      Purpose: to encourage faculty to utilize advanced instructional technology in their teaching

   Concentration in First Three Years: CAI and Interactive Video

Nova University
1990 Summer Institute

Leadership for Innovation and Change

Advanced Technology Grants in CAI and Interactive Video

a. Features
   - faculty stipends to provide incentive
   - competitive selection by a faculty committee based on proposal

b. Timme Advanced Instructional Technology Center... a place to work
   - equipment:
     several Zenith 286-based microcomputers
     several supported authoring systems
     Pioneer Laserdisk players
     Macintosh SE+ with Pioneer Laserdisk Player and Apple CD-ROM
     extensive collection of shareware on CD-ROM
     demonstration site for Wisc-Ware

c. Support
   - workshops in authoring systems
   - limited hand-holding

Nova University
1990 Summer Institute

Leadership for Innovation and Change

Results to Date

Reading Images
Leigh A. Caskey — Assistant Professor
Department of Television Production
College of Education

(this project was a winner in the 1989 Zenith Masters of Innovation National Competition)

Nutrition Services in the Community
Francis L. Miller — Associate Professor
Health Related Programs
College of Allied Health

An Atlas of Hematology
John H. Landis — Associate Professor
Clinical Laboratory Sciences
College of Allied Health

Term Paper Research Step-by-Step
Keitha Breault
Linda Makonnen — Associate Professors
University Library

L. A. Caskey
Assistant Professor
Department of Television Production

READING IMAGES

In a society saturated with images, it is essential for students in a media curriculum to be equipped with a method for evaluating and understanding the information included in those images. This concept of visual literacy is one of the most difficult and ambiguous ones for beginning media students to learn. By combining CAI with interactive video, students can develop and practice their ability to decipher and interpret visual messages. The result is a common framework of experience that can be used in and out of class to aid in understanding the images they create and the images they see.

Authoring System: IconAuthor Version 2.0

Videodisc:	REGARD FOR THE PLANET -50,000 photographs by Marc Garange distributed by THE VOYAGER COMPANY
Other Software:	Windows Version 2.0 with MS-DOS 3.3
Hardware:	Low profile Zenith Z-286 Pioneer Laservision player LD-V4200 Flat screen color monitor Zenith ZCM-1490 (text) Zenith ZVM-135 Monitor

Francis L. Miller, RD, MPH
Associate Professor
Health Related Programs

NUTRITION SERVICES IN THE COMMUNITY
A COMPUTER INTERACTIVE VIDEO PROGRAM

GOAL: The main goal of this project was to develop a computer interactive video system which would provide students with practice in locating and using nutrition services in the community.

LEARNER OBJECTIVE: After completion of the nutrition services CAI program, the student will be able to:

1. Locate nutrition services in the community.
2. Evaluate the quality and appropriateness of nutrition services.
3. Determine which service is most useful for specific clients.

VIDEODISK: IVAN Sharedisk II
Image Premastering
1781 Prior Avenue North
Saint Paul, Minnesota 55113

CONTENT: There are two basic programs. The first simulates the experience an individual might have as he or she searches for nutrition services in the community. The student is given choices of ways to locate services. Some result in success and others in failure. If the search fails, the student is given the opportunity to try again. When the search succeeds, the student is given the opportunity to learn about the service he or she has located. Students may exit the program at any time they feel they have learned enough.

The second program tests students knowledge. The test includes a series of examples of clients who have nutrition-related problems and asks the student to choose the best agency for referral. There are explanations for each incorrect answer. If a student gets an incorrect answer twice on any one question, the program instructs him/her to return to the first program and learn more about nutrition services.

John H. Landis
Associate Professor
Clinical Laboratory Sciences

INTERACTIVE VIDEODISC: AN ATLAS OF HEMATOLOGY

The program Guide was used to index a videodisc containing still photographs and motion scans of blood cells. The basic structure of the program is an outline that expands and contracts as the user selects topics of interest. The index is searchable with a "find" command using key words. The videodisc images are displayed on a second monitor and the player is controlled from the computer.

Guide is a hypertext environment that allows the creation of "buttons" on the monitor of the computer. These "buttons" are used to unfold and fold information that is hidden from the user. This is analogous to a book, but the user retrieves the information instantaneously and gets exactly the information needed. "Buttons" are also used to control devices attached to the computer such as a videodisc player. A signal may be sent to search and display a specific frame of the disc such as an example of sickle cells or to play a segment of video showing a bone marrow scan of a patient with leukemia.

This application is currently in a formative evaluation process. It is being used by medical technology students in both the student laboratories in the Clinical Laboratory Science Department and in the FSU Library. The students are enrolled in an advanced hematology course, and they are using the application as a review mechanism for red and white cell morphology.

SOFTWARE: GUIDE 2.0 Owl International
2800 156th Ave. S.E.
Bellview, WA 98007
Cost: $159.00 (Requires MicroSoft Windows)

VIDEODISC: Laboratory Medicine Video Library: Atlas of Hematology
University of Washington
Health Sciences Center for Educational Resources - SB-56
Seattle, Washington 98195
(206) 545-1186
Cost: $300.00

HARDWARE: Zenith 286 LP with FTM VGA monitor
Microsoft Mouse
Pioneer LD-V4200 CLV Videodisc Player
Auxillary composite Color Monitor for videodisc images
Approximate cost: $3500.00

Keitha Breault
Linda Makonnen
Associate Professors
Library and Instructional Services

TERM PAPER RESEARCH STEP-BY-STEP

Writing research papers in an integral part of a college education. When faced with such an assignment, many students do not know where to begin. Having had little library experience, they are often overwhelmed by the size of a university library and its collection.

In order to assist them in this process, we have devised a computer assisted SEARCH STRATEGY to take them through the various steps of writing a research paper. They can either go through the entire process or directly to any particular topic for the further explanation.

1. Select topic
2. Find background information; clarify terminology
3. Redefine topic; analyze information needs
4. Research topic
5. Take notes
6. Find additional material
7. Evaluate material
8. Write paper
9. Footnotes and bibliographies
10. Checklist

BIOGRAPHICAL SKETCH OF DOCTORAL CANDIDATE

Donald F. McAllister was born September 30, 1934 in Breckinridge, Minnesota, the son of Fred and Loretta McAllister. He earned a Bachelor of Science degree in Physics from the California Institute of Technology in 1956, and a Master of Science degree in Astronautics from the Massachusetts Institute of Technology in 1958. He completed all coursework for a Doctor of Science degree in Astronautics, with a minor in mathematics, from the Massachusetts Institute of Technology in 1960.

From 1964 to 1979 he was a Senior Engineering Specialist in Spacecraft Guidance and Navigation at TRW Systems in Redondo Beach, California, where he helped develop the guidance and navigation equations for the Apollo manned lunar landing missions. Since 1980 he has taught calculus-based physics and mathematics at El Camino Community College in Torrance, California. He holds community college teaching credentials in mathematics and physics from the state of California. Prior to teaching at El Camino Community College, he taught Astronomy part-time at Loyola Marymount University, and evening engineering courses at the University of California in Los Angeles.

Don entered the Nova University Ed.D. program in 1988, with a specialization in Higher Education. His practicum research in the Nova University Programs for Higher Education was in the areas of physics instruction, operations research, and computer science applications to college education.

As a student in the Programs for Higher Education at Nova University, I do (X) do not ( ) give permission to Nova University to distribute copies of this Major Applied Research Project on request from interested parties. It is my understanding that Nova University will not charge for this dissemination other than to cover the costs of duplicating, handling, and mailing of the materials.

November 6, 1990
(date)

Donald F. McAllister
Donald F. McAllister

I certify that I have read and am willing to sponsor this Major Applied Research Project submitted by Donald F. McAllister. In my opinion it conforms to acceptable standards and is fully adequate in scope and quality as a Major Applied Research Project for the degree of Doctor of Education at Nova University.

November 13, 1990
(date)

Frederick C. Kintzer
Frederick C. Kintzer, Ed.D.
MARP Advisor

I certify that I have read this Major Applied Research Project and in my opinion it conforms to acceptable standards for a Major Applied Research Project for the degree of Doctor of Education at Nova University.

NOVEMBER 19, 1990
(date)

John R. West, Ed.D.
Local Committee Member

This Major Applied Research Project was submitted to the Central Staff of the Programs for Higher Education at Nova University and is acceptable as partial fulfillment of the requirements for the degree of Doctor of Education.

12-20-90
(date)

David S. Flight, Ph.D.
Central Staff Committee Member